MAY -9 1955

96th year

MARCH 1955
Vol. 182—No. 3

AMERICAN Gas Journal

THE LIBRARY OF CONGRESS
SERIAL RECORD
MAY 10 1955
COPY

new
water heater beauty...
new
ease of service...
new Robertshaw-Grayson
UNITROL® 200 WATER HEATER CONTROL

UNITROL 200 water heater control brings a new sales dimension to automatic gas water heaters — thanks to its beauty of design. Styled in a wide range of colors, reduced in size, Model 200 can be installed flush or concealed — is readily serviced should it be necessary. And its attractive aluminized snap-on cover adds real beauty to any water heater design.

With Robertshaw-Grayson Model 200, handsome is and handsome does — because under its exterior beauty is all the famed dependability of earlier UNITROL water heater controls that made them first choice of water heater manufacturers everywhere.

Ask your water heater manufacturer for full details or write:

Robertshaw-Fulton
CONTROLS COMPANY
Grayson Controls Division, Long Beach, California
Robertshaw-Fulton Controls (Canada) Ltd., Toronto

They go best together!

The best gas odorant / The best odorant service

Calodorant "C"—*the best quality cyclic sulfide.* **Alert "80"**—*the best economy priced, quality mercaptan.*

Calodorant "C" is the only natural gas odorant in use that is completely stable in high pressure lines—1000 psi or more—and at low temperatures—0°F or lower. Performs equally well at medium and low pressures.

Alert "80" has been proved in all types of distribution systems under today's more demanding operating conditions. It has met every test by large and small utilities.

Whatever your individual problem, chances are Oronite has already done the research work on it and has the answer. Since the marketing of the first gas odorant in 1927, Oronite's large research facilities have continually studied odorant problems.

Want to know how to neutralize odorant "spills" or help on how to deodorize drums for re-use, or resale? Write your nearest Oronite office for Bulletin 70-16.

If you have an odorization problem, why not talk it over with us?

ORONITE CHEMICAL COMPANY

ORONITE CHEMICAL COMPANY

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TESTING...always TESTING...

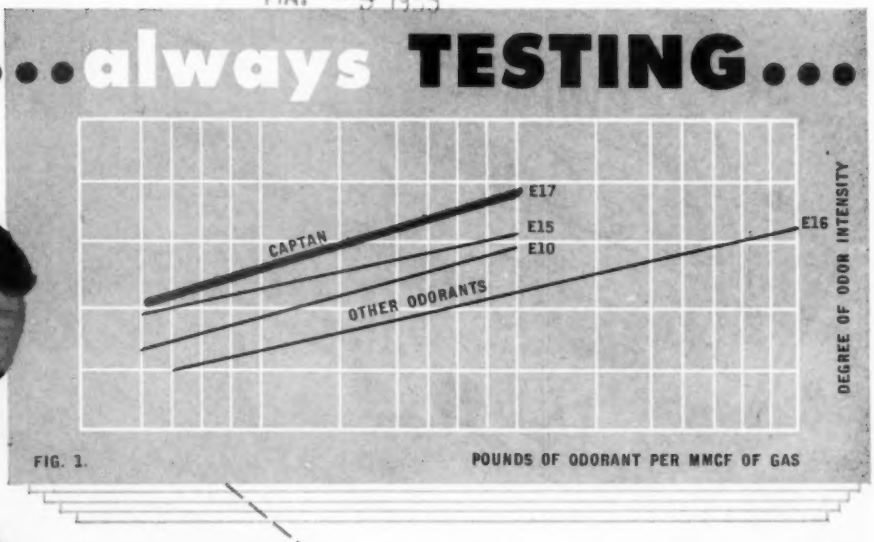

FIG. 1.

and always CAPTAN *ON TOP!*

But being best right now does not satisfy us . . .

NATURAL GAS ODORIZING CO., INC., is proud of the fact that odorization is their *one* and *only* business. Their objective is to continue to make the finest gas odorant possible.

To maintain outstanding leadership, CAPTAN is regularly tested, not only by the company's own, well-trained chemists, but also by independent laboratories which make comparative tests of all natural gas odorants.

Results of these practical tests definitely prove *CAPTAN best.* CAPTAN has established itself as the leader in this field and intends, through scientific research, to not only continue to be leader, but to widen the gap of its superiority over all others.

DON'T DELAY . . .
phone, wire or write us today.

Prompt Service from our . . .

- EXPERT SPECIALLY TRAINED ENGINEERS
- COMPETENT OFFICE FORCE
- STRATEGICALLY LOCATED WAREHOUSES
- RELIABLE SHIPPING SERVICE

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Specify VULCAN

...and be SURE!

To guarantee Vulcan quality, every diaphragm is critically tested in the factory.

For your gas meters and gas regulators don't just order "synthetic diaphragms". Be *sure*... specify *Vulcan!*

Vulcan has produced superior synthetic diaphragms for more than 20 years. Equally efficient with manufactured, natural, L. P. gas—or combinations—they are leak-proof, accurate and durable and have earned the high degree of acceptance accorded them.

Vulcan synthetic diaphragms assure better service, lower maintenance costs. Write for your free copy of "The Heart of a Gas Meter".

VULCAN RUBBER PRODUCTS, INC.

A Subsidiary of Reeves Bros., Inc.

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VULCAN RUBBER PRODUCTS INC.

Specify VULCAN — and be sure!

AMERICAN
Gas Journal

VOLUME 182 | 96TH YEAR : : MARCH 1955 | NUMBER 3

This month...

AMERICAN GAS JOURNAL, the gas utility industry's publication for the past 96 years, has been acquired by The Petroleum Engineer Publishing Company, Dallas.

"Since 1859, when the AMERICAN GAS JOURNAL started chronicling the events and technologies of the gas industry, and serving as outspoken commentator on industry affairs, it has acquired the stature of an honored and respected industry institution," Joe B. Woods, president of the company now publishing the AMERICAN GAS JOURNAL, said in his announcement of the change in management.

"In light of its highly-active history, we assume publication of the AMERICAN GAS JOURNAL with a distinct sense of responsibility and the determination that we shall continue, vigorously, to widen its range of values to the industry," he asserted.

Hilding H. Carlson, who has been editor, was appointed editorial director by the new management.

An enlarged editorial staff has been assigned to activate Mr. Woods' statement.

"There's a tremendous spread of techniques involved in the gas industry that used hand-hollowed wooden pipes and now uses 1,000-mile steel pipes operating at pressures of 1,000 pounds," Mr. Carlson commented following Mr. Woods' announcement. "While that dramatic indication of gas industry advancement represents decades, fully recorded in the JOURNAL, current advances are being applied by gas companies at a rapid rate to assure the public of service that is efficient, economical, reliable and safe.

"The *new* AMERICAN GAS JOURNAL is rededicated to its service of presenting authoritative and directly-useful information on management, operation and sales, in the highest interests of the gas companies," Mr. Carlson emphasized.

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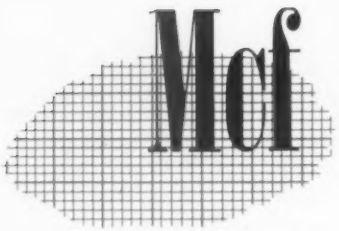

RESERVES of natural gas up slightly at end of 1954, from 1953 level. Production *zoomed* during year. Details of AGA-API annual report in April issue.

ADVERTISING by AGA, with sock-type dramatics, has been directed at the mass-feeding industry. We like one 2-page spread with fat chef obviously savoring the aroma from his kettle on gleaming restaurant range and flanked by equally-gleaming gas oven and deep-fat fryers.

WATCH for more-and-more interest in gas utilities reading meters annually or semi-annually and then billing customers, proportionately, on monthly basis.

AUTOMATION in gas industry and in utilization of gas for industrial processing is surging ahead. High possibilities, in both cases, for new and advantageous efficiencies with related economies. GAS JOURNAL will soon present continuing series of examples of practical and applied automation of interest to utilities.

INDUSTRIAL utilization of gas now accounts for 111,400 customers, buying 33-trillion therms with utility revenue value of $800-million—all for new highs—says recent release of Gas Appliance Manufacturers Association.

FEATURE article in current *Guaranty Survey*, widely-circulated and respected monthly publication of Guaranty Trust Company of New York, deals with Federal regulation of gas producers. Strong stand opposing regulation is taken.

ORIGINAL COST of gas production, depreciated, is basis for rate-making proposed in 2 bills before House as amendments to Natural Gas Act. HR 3490 was introduced by Rep. Vanik (D., O.), HR 3616 by Rep. Yates (D., Ill.).

EXCLUSION of independent producers from provisions of Natural Gas Act is objective of another bill, HR 3703, submitted by Rep. Rogers (D., Tex.).

ALSO, another producer-exemption bill, HR 4168, was dropped in the mill by Rep. Boggs (D., La.).

MORE amendments for Natural Gas Act are in prospect with HR 4214, introduced by Rep. Rogers (D., Tex.), requiring sale of gas, *if it is requested*, for irrigation power purposes.

GEORGIA Senate committee killed resolution for sweeping investigation of utilities and their rates.

WELLHEAD gas prices in North Dakota missed commission price-fixing when state Senate killed such a bill.

UNDERGROUND storage facilities would be covered by right of *eminent domain* under provisions of proposed amendment to Natural Gas Act, S 712, introduced jointly by Sen. Dirksen (R., Ill.) and Sen. Douglas (D., Ill.).

CONSTRUCTION activities, throughout country, continue in boom proportions. We note the obvious: practically every family-unit of residential construction represents a prospect for gas utility service; *every* unit is prospect for gas appliance sales, regardless of whether utility or LP gas is to be used.

OUTPUT of American industry has been upping for 4 successive months, says Cleveland Trust Co. *Bulletin*, noting that durables, nondurables and minerals were in on rise as of latest analysis.

SOLAR and nuclear energies will have special sessions devoted to them at American Power Conference, late this month.

NET incomes of 2,392 companies in 38 industrial groups showed 4% rise, at end of 1954 compared with 1953. Plus percentages of individual groups ranged from 1-to-47. Minuses ranged from 2-to-37. All this in preliminary summary by National City Bank of New York.

PLUS 1% was in "shoes, leather, etc." Also 1% in "petroleum products and refining." Top plus, 47%, was in "real estate."

MINUS 2% was in "food products" and in "lumber, wood products." Big drop, 37% was in "textile products."

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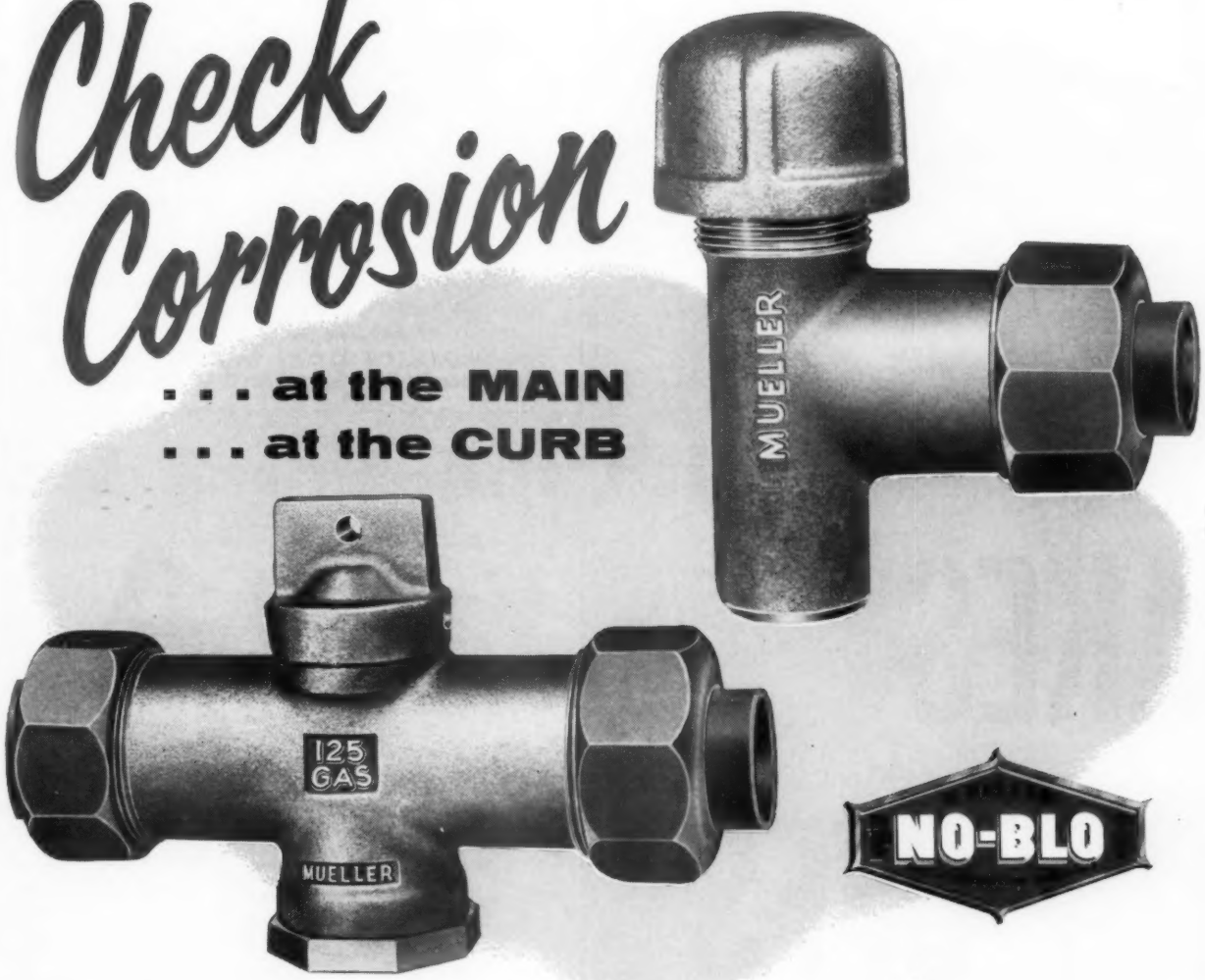
MUELLER

Check Corrosion

. . . at the MAIN
. . . at the CURB



Now you can use No-Blo fittings, with all their advantages, with practically any kind of pipe. A new coupling completely insulates the service pipe from the fitting — thereby interrupting the corrosive galvanic circuit between the service pipe and the main. The insulating gasket also serves as a spacer to permit the use of copper pipe, or other pipe with the same O. D., with regular Dresser Coupling designed for steel pipe.

Service Tees, Service Valve Tees and Curb Valve Tees with a variety of inlets now have insulating coupling outlets for steel or copper — giving you positive corrosion control and greater adaptability at the main.

A full line of Curb Stops with either or both ends incorporating insulating coupling for steel or copper gives you additional protection and adaptability at the curb.

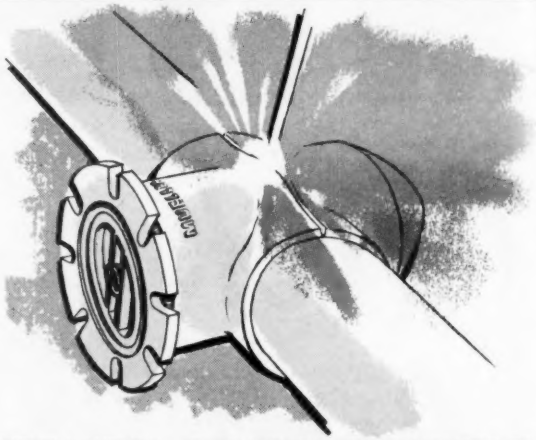
Consult your Mueller Representative, your new G-97 Gas Distribution Products Catalog or write direct for complete information on these products.

MUELLER CO. Dependable Since 1857
MAIN OFFICE & FACTORY DECATUR, ILLINOIS

MUELLER®

NO-BLO Method

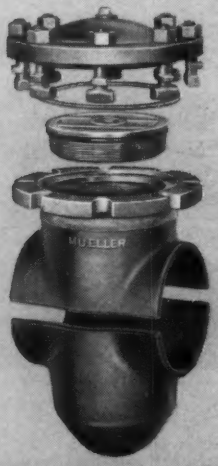
MAKES STOP-OFFS SAFELY...



STEP 1. WELD! TACK WELD FITTING HALVES TOGETHER, POSITION AND WELD TO PIPE. PLUG SHOULD REMAIN IN FITTING HAND TIGHT DURING WELDING. ALLOW TO COOL WITHOUT CHILLING, TEST AND BOLT SPECIAL GATE VALVE TO FLANGE.

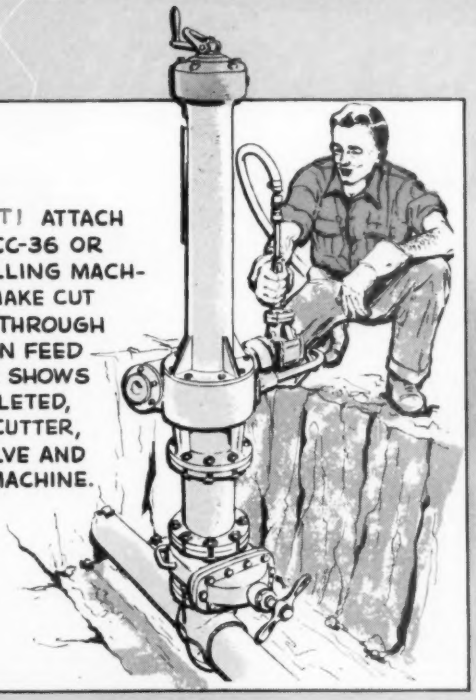
with the No. 2 Line S

STEP 3. STOP-OFF! FASTEN RUBBER STOPPER TO INSERTING BAR OF STOPPING MACHINE AND BOLT MACHINE TO GATE VALVE. INSERT STOPPER COMPLETELY INTO FITTING AND EXPAND. PIPE IS NOW STOPPED-OFF AND MAY BE WORKED ON SAFELY.



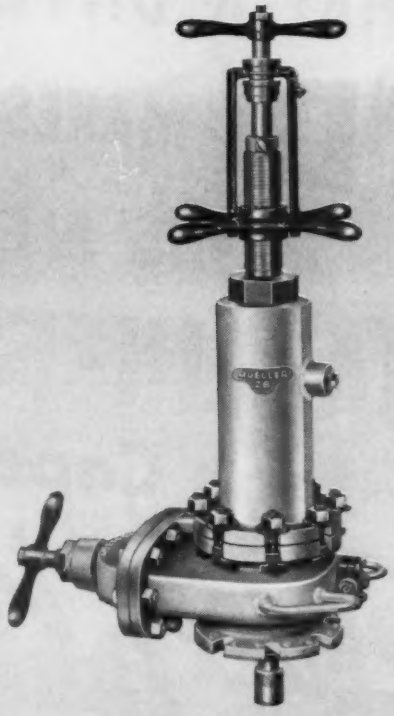
H-17255 WELDING FITTING for 3" and 4" steel pipe. Furnished with "O" ring completion plug, completion cap and series 15 flanges. Series 30, 40 and 60 flanges available.

This is another of a series showing the broad application of Mueller No-Blo Fittings and Machines used for their installation.



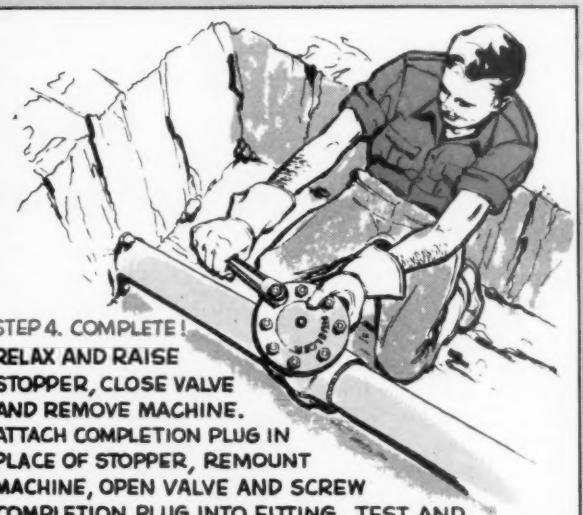
STEP 2. CUT! ATTACH MUELLER CC-36 OR C1-36 DRILLING MACHINE AND MAKE CUT ENTIRELY THROUGH PIPE. WHEN FEED INDICATOR SHOWS CUT COMPLETED, RETRACT CUTTER, CLOSE VALVE AND REMOVE MACHINE.

Stopper Unit...



H-17235 STOPPING MACHINE

C1-36 DRILLING MACHINE

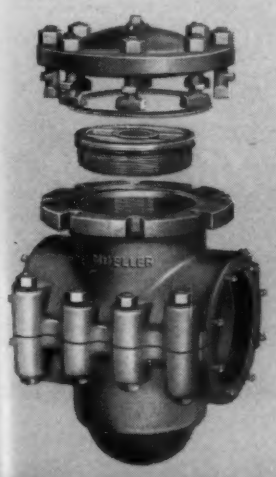


STEP 4. COMPLETE! RELAX AND RAISE STOPPER, CLOSE VALVE AND REMOVE MACHINE. ATTACH COMPLETION PLUG IN PLACE OF STOPPER, REMOUNT MACHINE, OPEN VALVE AND SCREW COMPLETION PLUG INTO FITTING. TEST AND REMOVE MACHINE AND GATE VALVE. TIGHTEN PLUG SECURELY AND BOLT COMPLETION CAP IN PLACE.

Positive stop-offs are made quickly and easily with the No. 2 Line Stopper Unit. Only two machines are needed to drill the main; insert, expand and extract the stopper; and insert and extract the completion plug. And all operations are performed safely under pressure—with no blowing of gas.

For use with 3" or 4" steel pipe and 4" cast iron pipe at working pressures to 100 p.s.i. and temperatures to 250° F.

For full specifications and details on the No. 2 Line Stopper Unit or other No-Blo Fittings, consult your Mueller Representative, Catalog G-97 or write direct.



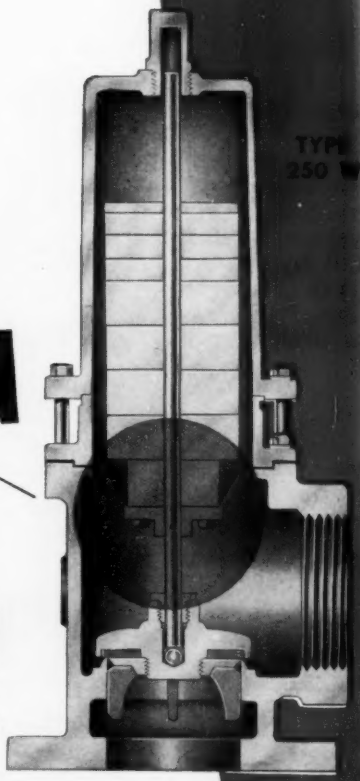
H-17266 MECHANICAL JOINT FITTING for 4" cast iron or H-17265 for 3" and 4" steel pipe when welding is not desired. Furnished with "O" ring completion plug, completion cap and series 15 flanges.

MUELLER CO.

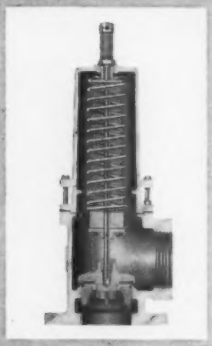
Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

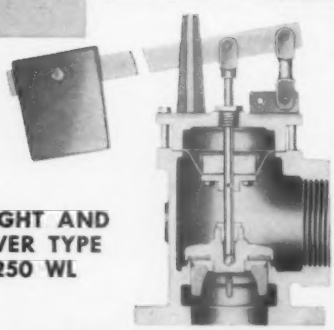
WHAT A DIFFERENCE A "D" MAKES in the NEW CHAPLIN-FULTON High Capacity *Safety Valves*



"D" stands for diaphragm, and what a difference it makes in the discharge ability of the new Chaplin-Fulton High Capacity Safety Valves—2½ times more flow capacity. After initial opening, the discharge pressure acting upward on the diaphragm insures maximum opening, and guarantees full flow with minimum increase in in the blowing pressure. This means greater protection for the users of Chaplin-Fulton Type 250 Safety Valves, adaptable in three models to all gas systems from ounces to 100 pounds. Sizes 2" to 6" inclusive.



SPRING TYPE
250 S



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LEVER TYPE
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Simple.... Foolproof

ACCURATE DEPENDABLE

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Chaplin-Fulton
MANUFACTURING COMPANY
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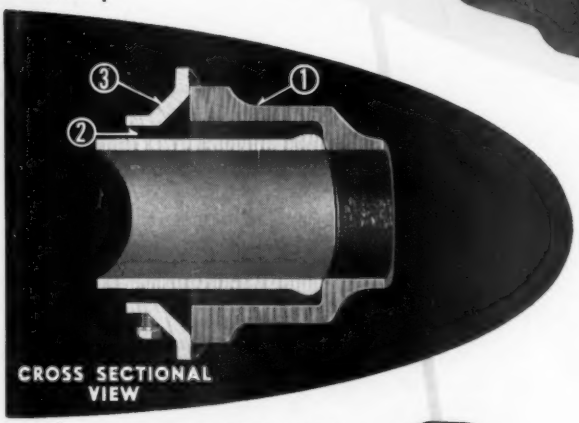
Simplified Bell Joint Clamps

1. Bell joint
2. Perma-Seal Compound
3. Bell joint clamp



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WITH PERMA-SEAL COMPOUND

WITH THE FOLLOWING ADVANTAGES:

- Smaller street openings required because no excavating or cleaning necessary in back of the bell.
- The clamp does not require adjustment, or filling and facing of the bell.
- ***The clamp is engineered to fit all variable pipe wall thicknesses without adjustment and to fit all types of bell joints including sleeves, drip pots, valves and odd size pipes.*** Available sizes: 3" to 36" diameter.
- This clamp fits in confined areas because it requires no greater area than the existing bell for installation.
- ***This leak clamp becomes a seal by adhesion rather than by compression.***
- This clamp allows ground movement and vibration to take place without the danger of leaks after installation.
- Once installed the joint becomes trouble-free and permanent.

Write: for full information and prices about the Newest Method in Pipe Connections

New Perma-Seal and Safety Seal Weld sleeves available for steel to steel, steel to cast iron, split sleeves for repair of steel pipe, and completely insulated sleeves for corrosion control.

Typical installation in the removal of valve and replaced with safety seal weld sleeves.

Steel to steel sleeve

Cast to cast sleeve

UNITED PIPE UTILITY SUPPLIERS, INC. BOX 777, BELOIT, WISCONSIN

EMPIRE

MAKES THE BEST *Gas* HEATING APPLIANCES IN THE WORLD

There's NO DOUBT *about it!*

You keep warm... your cabinet keeps cool!

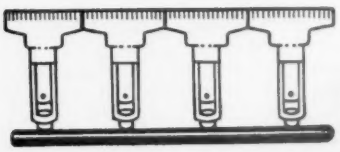
FULL VIEW OF FIRE

An abundance of warm, cheerful radiant heat is produced by the unusually large radiant area.

SERVICE FROM FRONT

Complete burner assembly accessible for servicing from this handy service door. Burners always in full view of serviceman. Not necessary to remove glass and radiants to service burner.

Gas
CIRCULATOR HEATER
WITH THE FAMOUS
Thriftmatic
GAS BURNER



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SILENT IN OPERATION

MINIMUM FIELD SERVICE

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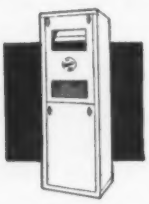
USER SATISFACTION

EMPIRE MAKES YOUR JOB EASIER

COUNTER FLOW AIR CONDITIONER

Gas FLOOR FURNACE



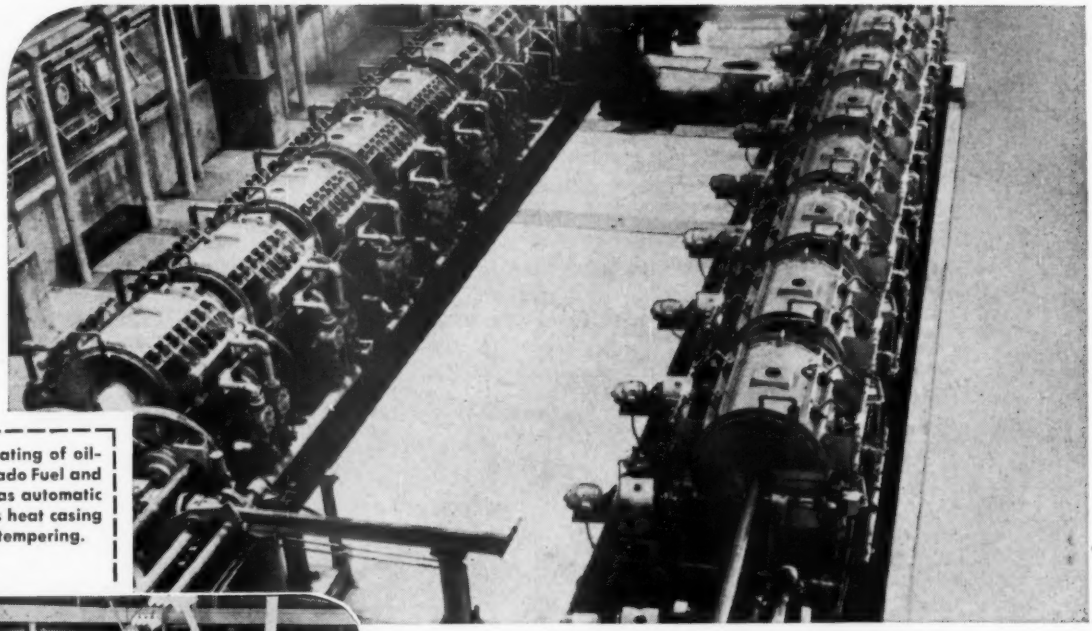
WINTER AIR CONDITIONER

ZONE CONTROL RECESSED HEATER

EASIER SALES . . . EASIER INSTALLATION . . . EASIER SERVICE

EMPIRE STOVE COMPANY
BELLEVILLE, ILLINOIS

GAS CAN DO A BETTER JOB IN EVERY INDUSTRY



Continuous heat treating of oil-well casing at Colorado Fuel and Iron Company. Selas automatic Gradiation furnaces heat casing for hardening and tempering.

Line of Selas soldering furnaces in gas meter repair shop of Public Service Electric and Gas Company.

SELAS *Gradiation Equipment*

Speeds Heating . . . Cuts Costs . . . Improves Product Quality

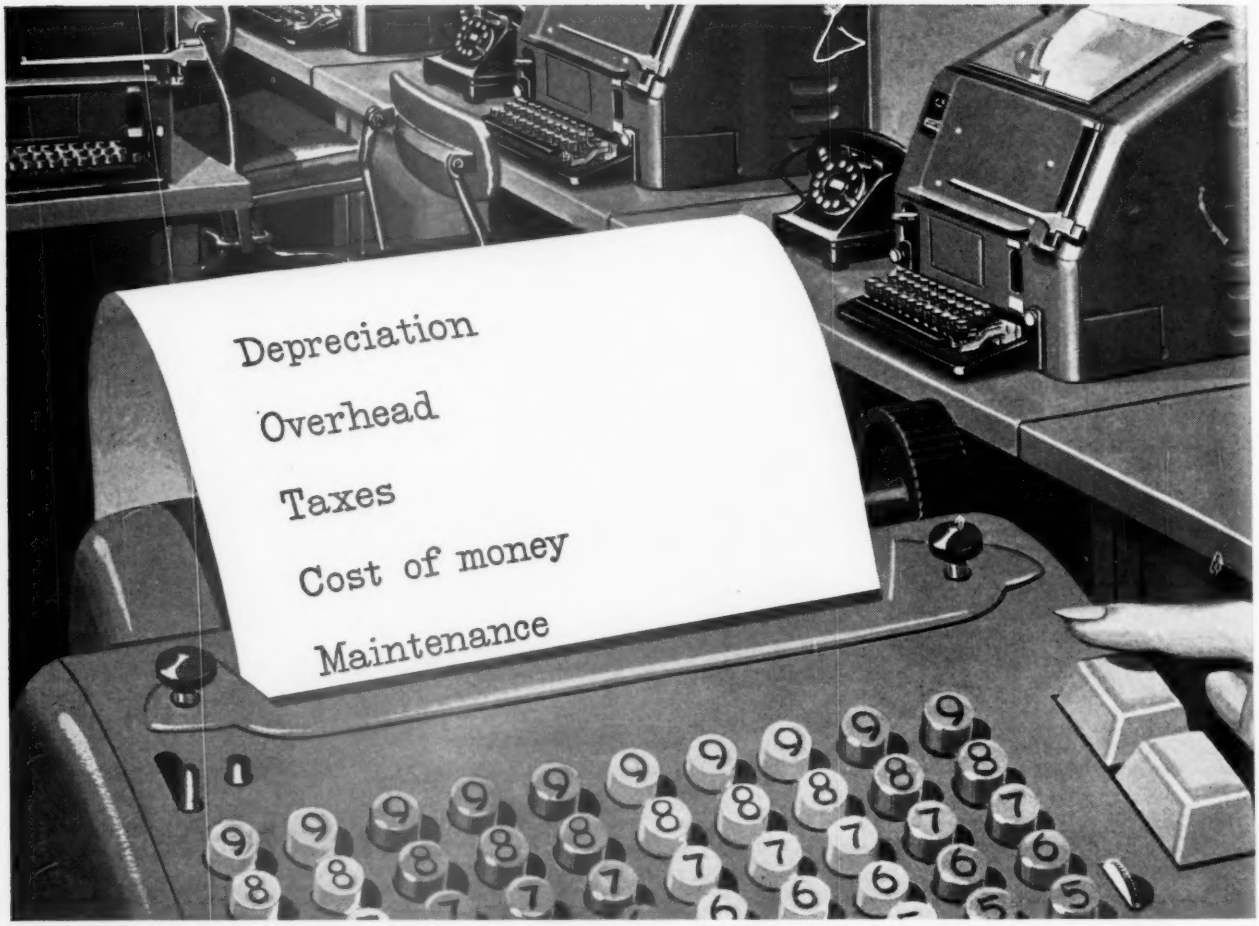
● Whether it is a continuous heat treating furnace in a large steel mill, producing pipe, or a small soldering furnace used for meter repair, gas can be made *the* important source of heat for precision processing, speedier production and greater economy.

Whatever the heat processing requirement—of fluids, metals, textiles or other products—the use of Selas Gradiation equipment can improve the utilization of gas as *the one fuel* which should be accepted as industry's basic and consistent source of reliable heat for process.

SELAS

CORPORATION OF AMERICA • PHILADELPHIA 34, PA.

Heat Processing Engineers for Industry • Development • Design • Manufacture



If you provide your own communications system...

HAVE YOU ADDED UP ALL THESE COSTS?

Owning and operating your communications system can be a costly experience, with many costs frequently overlooked. Depreciation, taxes, overhead, maintenance, loss of interest on capital all contribute to your total communication expense.

Bell System communications are low in cost. You pay only a fixed monthly charge for services and facilities tailored to your exact needs. No more, no less. Your capital is not tied up but left free for income-producing investments in *your* business.

The installation of your communications is just the beginning of the Bell System job. Maintenance, replacement, inventory, storage, extension and rearrangement are all handled rapidly and efficiently—no longer problems for you.

Let us show you how Bell System know-how and experience can be put to work to solve your communications problems. For a complete communications study, made without charge, call your local Bell Telephone representative today.

TELEPHONE

TELETYPEWRITER

MOBILE RADIO

METERING CHANNELS

BELL TELEPHONE SYSTEM

Editorial:

It Can Be Done—It Is *Being* Done

NEVER does this page include an expression relating to the high desirability of gas industry coordination, but that we receive comments, *pro* and *con* —all of which have our full respect. The range of comments is pole-to-pole: throw the pipelines out of AGA and make it a utility association . . . the relationships of the utilities and the pipelines should be tightened, in their mutual interests. Truly, a house divided within and against itself!

Of course, the greatest weight of comment is in opposition to our deeply-sincere pleas for gas industry coordination. That's "normal." Most of us never bother to express our agreement with words, principles or actions that have our approval.

Coordination is possible! It is being practiced today by one pipeline company, at least. That may be an informal coordination, in which the utility-customers played no part whatsoever, but the values to the utilities are there.

Tennessee Gas Transmission Company certainly is a pipeline. And Tennessee has been placing large, colorful, dramatic advertisements in a long list of magazines and newspapers.

What does TGT say about this series of advertisements?

"The main purpose of this advertising is to accelerate the sales of natural gas through our system . . ."

There we see that TGT is interested in the sale of gas. That gas is sold for utilization, not by TGT, but largely by the utility-customers of TGT. This advertising program has been placed so that it reaches the attention of the utilities' own customers.

How does TGT help sell gas in those ads?

First, with appropriate quickly-read main copy. Then, with varying illustrations of gas-use. One ad shows a gas-fired ceramic kiln and the caption describes industrial advantages of gas . . . below, a modern kitchen and its caption relating to domestic advantages. Another ad has 4 close-ups of appliances: home heating, cooking, heating water, drying clothes.

So, TGT not only coordinates with the utilities in their efforts to sell gas but, also, with the appliance manufacturers in a generalized merchandising effort.

TGT, in enlarging upon the purpose of the advertising program, says that it is intended "to make TGT more widely and favorably known to the public, our ultimate consumer . . ."

That, as it is reflected in the continuing operation of pipeline facilities, would seem to accrue favorably to both pipeline and utilities, as service from pipeline-to-utility-to-consumer merits high regard.

More of TGT's viewpoint: "Such advertising, we believe, not only benefits TGT and the gas industry; it renders a valuable service to the public as well . . . advertising is as necessary to continuous long-term profits as sound financing, accurate cost accounting, competent research, intelligent government regulation, and enlightened employee and public relations."

This program of advertising, directed to the public . . . to gas consumers . . . to gas appliance prospects . . . has been under way for only a few months. In that time, however, TGT has had response to it that "has been most gratifying."

We can only hope that part of the response has taken the form of stimulating expressions from executives of TGT's customers . . . utilities.

What is the TGT view of the future for its program?

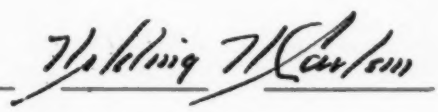
"We feel certain," they say, "that advertising will continue to play an increasingly important role both in the continuing progress of the Company and in the fast growing industry of which it is so big a part."

That, clearly, gives us the impression that TGT is not running these ads as a short-term flash-across-the-sky *and* that they consider themselves to be *part* of the gas industry.

This *is* coordination . . . it's a notable contribution to gas industry promotion in quarters where promotion is needed.

We would be remiss, indeed, if we did not salute Tennessee Gas, heartily, for this program . . . for this effective cooperation with the efforts of one group of utilities to sell more gas . . . and to sell it better.

Yes, coordination is possible—at least between the pipelines and utilities—because it is in action. *But*—with no thought to minimizing the TGT effort—this is only one voice of the many that COULD BE RAISED in a roar that could not be ignored.



Role of the Computer in Distribution Design

by **Carroll V. Kroeger**
Engineer
Central Indiana Gas Company

ONE of the most time consuming and perplexing problems confronting the distribution engineer is system design.[4] Network analyzers have facilitated evaluation of various designs by speeding up calculation of rates of flow and drops in pressure in the system.

Distribution system design consists of two basic problems: (1) Redesign of the existing system to accommodate growing loads in present territory, and (2) planning extensions to serve new loads in undeveloped territory. In either case the first requirement is the forecasting of design loads. Machine accounting[5] has been used to advantage to combine and total the individual customer records of consumption into convenient groups. The consumption is tabulated[8] and the total for each block on the street recorded. By application of peak hour factors the peak hour load may be obtained. This information is then posted to street maps for future reference. Then loads can be allocated to the distribution system, and to the individual regulator stations.

The next step is the calculation of the system pressures. This is a formidable task consisting of applying appropriate formula to the data assembled. The more complex the gas distribution system the more difficult becomes the problem of calculating the gas flows and pressure losses. As this complexity increases the more valuable becomes the network computer. The computer does not minimize the requirement for experience in the design of distribution systems. In addition it does not lessen the volume or accuracy of information required for solution. The computer does speed the computations and at the same time eliminates the chance for human error.

Hardy Cross Analysis

The usual manual method of calculation is by the use of Hardy Cross Analysis.[6] This method of analysis was developed by Professor Hardy Cross, at the University of Illinois in 1936, and was applied to the problem of flow in water supply network distribution systems. Professor Cross also indicated how the method might be extended to compute the flows of gas, steam, and air network problems. The adequacy of a gas distribution system can be determined by calculating the pressure drops in the different portions of the network. The flow of gas in the mains is assumed and the drop in pressure is calculated by use of applicable flow formula. The first assumption is not usually correct, so that the basic assumption must be revised until a proper balance of pressure is attained. The method is sometimes referred to as the Method of Balancing Heads.

The Hardy Cross Method is summarized as follows:

(1) A distribution of flow is assumed.

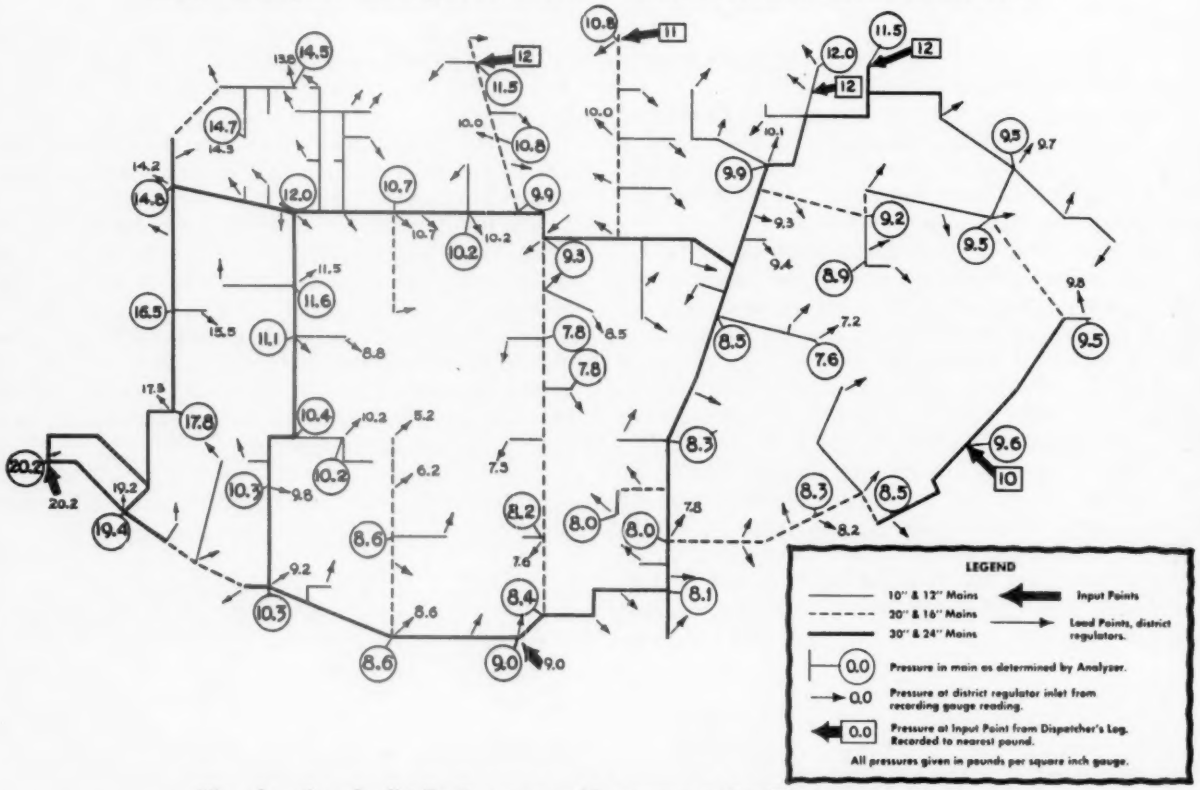
(2) The loss of head is computed in each leg of the network where $L = rQ^n$. Taking into consideration the direction of drop in potential the summation of the total loss in head around each loop is computed $\Sigma h = \Sigma rQ^n$.

(3) The sum of the quantities $R = nrQ^{(n-1)}$ is computed in each loop without reference to sign.

(4) A counterbalancing flow is set up in each loop to balance the head in the loop equal to:

$$\Delta = \frac{\Sigma rQ^n \text{ (with reference to flow direction)}}{\Sigma nrQ^{(n-1)} \text{ (no reference to flow direction)}}$$

How Analyzer Compares with Actual Pressure Measurements


LEGEND
10" & 12" Mains
20" & 16" Mains
30" & 24" Mains
Input Points
Load Points, district regulators.
0.0 Pressure in main as determined by Analyzer.
0.0 Pressure at district regulator inlet from recording gauge reading.
0.0 Pressure at Input Point from Dispatcher's Log. Recorded to nearest pound.
All pressures given in pounds per square inch gauge.

Map of portion of a distribution system, with pressures as described in the legend, above.

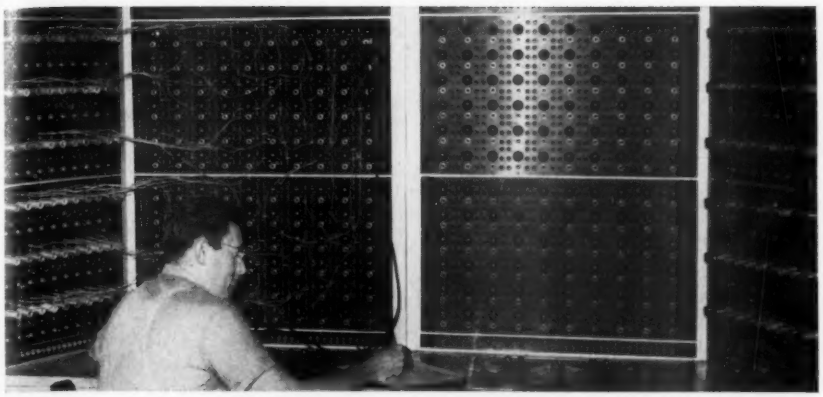


Fig. 1. B. E. Eakin, supervisor distribution calculator at Institute of Gas Technology, is shown solving a distribution network design problem on the Starr analogue analyzer.

(5) The revised flows are computed and the procedure repeated to the precision desired.

Computers have been termed "giant brains," but the terminology is probably a misnomer. Although the first experimental computers were large, present day computers are manufactured in a variety of sizes. Advances in transistors hold promise for even smaller computers. On the other hand these machines are not "brains" either. They cannot think and are limited by the intelligence of the human who operates them. The computer might be called more properly an Information Machine.

Two Types of Computers

There are two types of computers in current use for solution of distribution network problems: (a) the analogue[10] and (b) digital.[17] The analogue machine sets up a physical analogy to the type of problem it is designed to solve. It is capable of transforming a physical quantity into a different physical quantity, but in accordance with the rules of its construction. An analogous electrical network is substituted for the gas system in which electrical quantities are substituted for the flow rates of gas and the pressure drops in the gas network. The method of solution is rapid and accurate.

The Starr Analyzer is an analogue device in current use at the Institute of Gas Technology (Fig. 1) for solution of gas network problems. This system employs circuit rheostats to simulate main sections, vacuum tubes as load devices, a d-c source providing current to the network analogs, and an a-c source to power the vacuum tubes.

Each portion of main in the gas network is represented by a variable linear resistor. Connections to the sources of current represent inputs of gas to the system. Each gas load is represented by a load device (vacuum tube). The flow of current through the resistor is proportional to the pressure drop across the gas main. Since pressure drop depends on factors other than the pipe dimensions (wall roughness and flow rate) a special computational procedure, or specially designed resistor is necessitated, because of the non-linearity and in the basic flow rate equations. The calculator includes an instrument unit with the KQ circuit, a Type B unit providing rheostats to represent the main sections, a load unit that includes vacuum tube loads.

Stepwise Analysis Analog Computer Problem:

1. Preliminary study of map. Decision to apply concentrated loads as indicated on map. Tabulation of pipe diameters and lengths for each section.
2. Set up calculator for the problem.
3. Set load devices to carry proper current.
4. Calculation of K's for each section.
5. Set pipe resistors to required value of R_0.
6. Measure I_0.
7. Calculate R_1.
8. Set pipe resistors to required value of R_1.
9. Measure I_1.
10. Calculate R_2.
11. Set pipe resistors to required value of R_2.
12. Measure I_2.
13. Calculate Im_1.
14. Calculate R_3.
15. Set pipe resistors to required value of R_3.
16. Measure I_3.
17. Measure E.
18. Calculate P.

A recent development permits the operator to combine the multiplication of the pipe constants by the measured flow rate using the calculator instruments, and results in the rheostat's being adjusted correctly to his product. In using the KQ circuit, the operator plugs into a rheostat representing a specific pipe section and makes an adjustment on the instrument panel to bring the pointer of the right hand meter to the pipe constant multiplied by some convenient power of ten on the Z scale. The rheostat knob is adjusted until the pointer of the left hand meter indicates the recently measured flow rate, also multiplied by a convenient power of ten, on the E scale. While making the second adjustment, the first made adjustment is held fixed by an electronic circuit. Upon solution of the nonlinearity problem the data from the electric network can be converted into gas quantities in the distribution system. B. E. Hunt[9] lists useful applications of the calculator as follows:

1. Checking character of flows in existing system and adequacy of the system to meet load requirements.

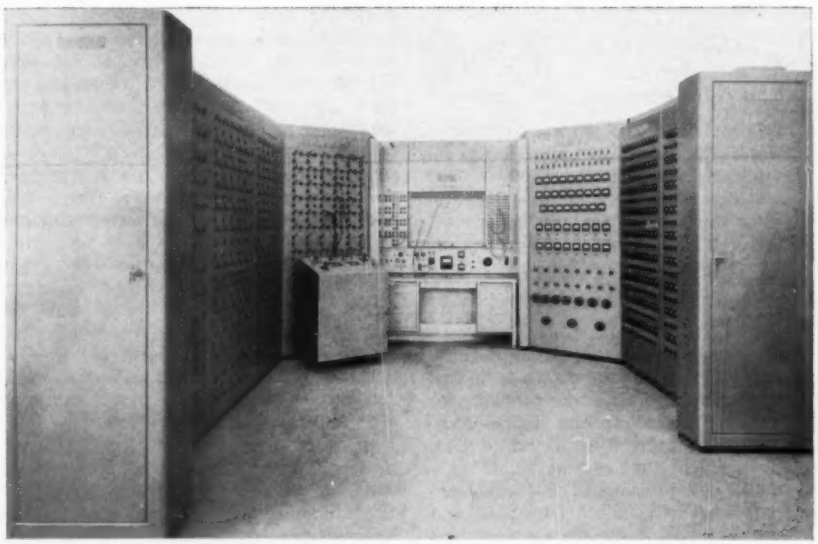


Fig. 2. General view McIlroy fluid network analyzer showing the 4 panels to the left of the central control section which comprise the network section. By inserting fluistors in sockets in the rear of these panels the pipeline network is set up. The angle panel to the right of the control section is the source control. Inputs to the network are controlled from this panel. The 2 panels on the extreme right carry the electronic load controls. The rolling cart shown at the left of the desk carries the master ammeter and voltmeter used to take readings from network panels.

2. Study of modification of existing system to enable it to handle future loads.

Another electric analogue computer in use for solution of distribution network problems is the McIlroy Analyzer[14] (Fig. 2). The McIlroy Analyzer was developed by Dr. Malcolm S. McIlroy, assistant dean of Cornell University's College of Engineering. This type of network computer has been installed by Laclede Gas Company,[12] the Columbia Gas System,[13] and Public Service Electric and Gas Company. This system utilizes special non-linear resistors termed the Fluistor, which perform automatically in a manner analogous to fluid in a pipe line. The Fluistor achieves a similarity between the pressure-drop-flow characteristic of the gas pipe line and the volt-ampere characteristic of the resistor. This feature allows the reading of solutions directly in gas units. It is necessary to select the pipe lines that are significant. Small distribution mains are ignored in determining rates of flow and drops in pressure in distribution feeders. Distributed loads are represented by concentrated loads at the specific network junctions. The steps of operation of the analyzer are as follows:

(1) Fluistors are inserted in the proper sockets on the rear of the network panel.
(2) The load devices are connected to the appropriate network terminals.
(3) Necessary cross connections on the network panel are completed.
(4) The source circuits are connected to the network terminals and source-control rheostats.
(5) Fluistor coefficients and circuit connections are checked.
(6) The main switch is closed raising the voltage input.
(7) All load currents are adjusted to the desired values.
(8) The flow rates and pressure drops are recorded.

This analogue machine utilizes high voltage a.c. as power. C. F. de Mey[11] of the Columbia Gas System lists as its purposes:

(1) It can determine the gas pressure at street intersections approximating a pressure survey.
(2) It can help select the best location for sources.
(3) It can show necessary additions for future construction.

Digital Computers

Digital computers are general purpose machines.[18] The analogue device is limited to the solution of the specific problem for which it was designed. The digital computer on the other hand is capable of solving any problem that can be stated in a mathematical expression. The digital machine is primarily a counting machine and is based upon use of the binary numerical system. The numerical system in use today is termed the common or denary scale of notation. Ten is termed the radix of the scale, which means that the arithmetical numbers are expressed as multiples of powers of ten. The significant factor in selecting the binary scale of notation for computation is that since only two numbers are required (1 and 0) binary numbers may be represented in electronic equipment by vacuum tubes being either off or on. Utilizing this principle the digital machine has been developed, which will automatically convert denary numbers into binary, compute in the binary and then supply the final answer in denary numbers.

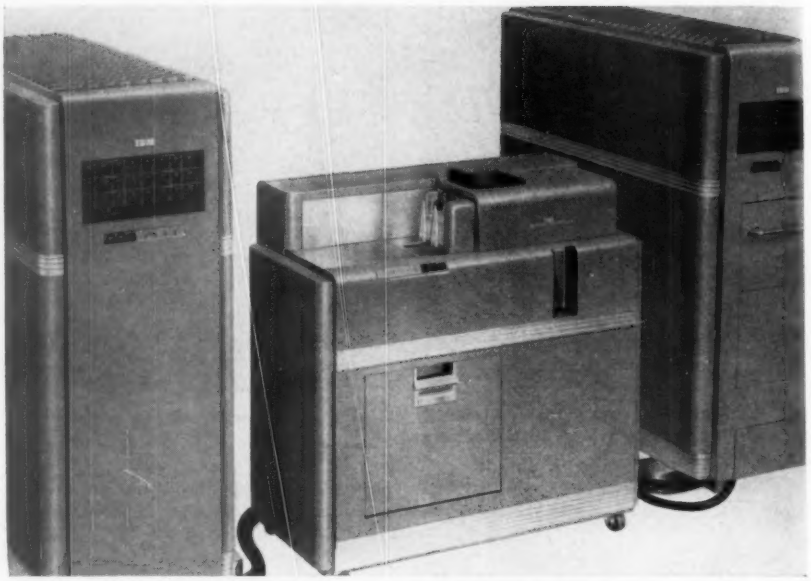


Fig. 3. IBM calculating and accounting machine

A machine of this type has recently been utilized to give solution to distribution network problems by The Peoples Gas Light and Coke Company.[25] An IBM calculating and accounting machine (Fig. 3) utilizing a punched card program performed the calculations in conjunction with the Hardy Cross Method. The distribution network is translated into code-punched cards. Basic data punched into the cards includes: assumed gas flows, main lengths, resistance factors, flow correction and pressure drop terms. After the basic data has been prepared and transferred to punch cards the digital machine takes over the task of computing the iteration.

Digital computers have the advantage of being multipurpose machines. They are in use for solving such engineering problems as gas volume calculations,[28, 29] both orifice metering and positive displacement, pipe stress calculations,[30] design of flexible protective casings for pipe lines,[31] flow and storage of natural gas in pipe,[33] pipe line dispatching,[24] and many others.[17] In addition they have been in use for some time in accounting for Billing, Payroll Accounting,[26] Stockholder records,[27] etc.

It is not necessary for a utility to purchase a computer to determine advantages that can be realized. Several institutions offer computer service on a consulting basis. Among these are the Institute of Gas Technology, Chicago, Illinois; The Midwest Research Institute,[32] Kansas City, Missouri, and the Princeton Computation Center, which recently was opened for service to all types of industry. Equipment usually may be rented on an hourly, daily, or weekly basis. Permanent staff provide special service in converting individual problems into forms workable by a computer.

The role of the computer in distribution design is to facilitate evaluation of design by speeding up computation of network analysis. The use of a computer does not lessen the volume or accuracy of information required for solution. Perhaps one of the best advantages is that it lifts the burden of routine calculation from the distribution engineer, giving him more time for analyzing and evaluating design problems, and basic research.

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[8] A Symposium on Methods of Load Forecasting and Its Relation to Distribution Design. Gas Age—July 30, 1953.
[9] Uses and Applications of the Distribution System Calculator. B. E. Hunt, AGA Proceedings, 1952.
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[11] Electronic Brain. AGA Monthly—September, 1953.
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Canada to Lay Longest Gas Line

TRANS-CANADA Pipe Lines, Ltd., is scheduled to begin construction early next year on the world's longest gas pipe line, to supply the growing markets of eastern Canada with gas produced in the Province of Alberta.

The Alberta government in May, 1954, granted Trans-Canada permission to export natural gas from that province at the rate of 540,000,000 cu ft a day to a total of 4 trillion, 350 billion cu ft over a 27-year period. As part of the 540,000,000 cu ft a day, Trans-Canada was allocated 150,000,000 cu ft a day for export to the Minnesota border.

The provincial government also announced at the time of granting the permit that Alberta's natural gas reserves had reached approximately 13½ trillion cu ft, an increase of one billion, 900 million cu ft in about a year. Alberta's own needs in the next 30 years were estimated at 4 trillion, 600 billion cu ft and a 6 trillion, 600 billion cu ft reserve was recommended.

Almost immediately, Trans-Canada applied to the Federal government in Ottawa for permission to move the Alberta gas 2250 miles across Canada. The cost was estimated at the time as in excess of $300 million. Approval from Ottawa was received in July, 1954, and plans for the pipe line project rapidly began to take shape.

At the time Trans-Canada was granted the export permit, the Alberta government also announced that as a measure of controlling the Alberta gas until it left the province at the Alberta-Saskatchewan border, a new company was to be organized to collect and deliver the gas to Trans-Canada's line at the boundary. The collection agency, Alberta Gas Trunk Line Company, subsequently was formed with directors representing the gas producers, the exporters, Alberta utility companies and the citizens of Alberta.

Two important factors governed Trans-Canada's choice of a route. It was to be laid so as to bring the benefits of natural gas to as many Canadians as possible, as economically as possible, and also to allow for expansion of its service to pace the growth of the nation. Passing through three provinces and into the heart of a fourth, the pipe line will put one-third of the population of Canada in a position to share abundant natural gas resources.

Plans call for the laying of nearly 560 miles of 36-in. diameter steel pipe between the Alberta-Saskatchewan border and Winnipeg, about 1140 miles of 30-in. pipe between Winnipeg and Toronto, and 296 miles of 24-in. pipe between Toronto and Montreal. A 24-in. lateral will run from Winnipeg south to the International boundary to deliver surplus gas for the Minneapolis-St. Paul market, a 14-in. lateral will run off the Toronto-Montreal section from Morrisburg, on the St. Lawrence River, to Ottawa and Hull, and 80 miles of 20-in. pipe have been laid and are carrying American natural gas from the Niagara River to Toronto. When the trans-continental line reaches Toronto, Alberta gas will flow through the Niagara-Toronto line.

The speed at which the construction teams will have to work is shown by the fact that plans call for the entire project to be completed in two operational periods. The line to Winnipeg and south to the International border by the fall of 1955, and the extension from Winnipeg to Toronto and Montreal by the winter of 1956.

Through Saskatchewan and part of Manitoba the main line will closely follow the Canadian Pacific Railway's main line or the No. 1 Trans-Canada highway, but through northern Ontario, the twin problems of lack of roads and wire communications will be faced.

The 80-mile lateral line from the Niagara River was started in July, 1954, and completed late in October. Cost of the 20-in. project was approximately $5,500,000.

This lateral, known as Niagara Gas Transmission line, currently carries United States gas from Tennessee Gas Transmission to Toronto to enable the distributor in the Ontario city, Consumers' Gas, to build up its market. Once Alberta gas reaches the area, Niagara Gas Transmission line will be used to carry Canadian gas into Southwestern Ontario.

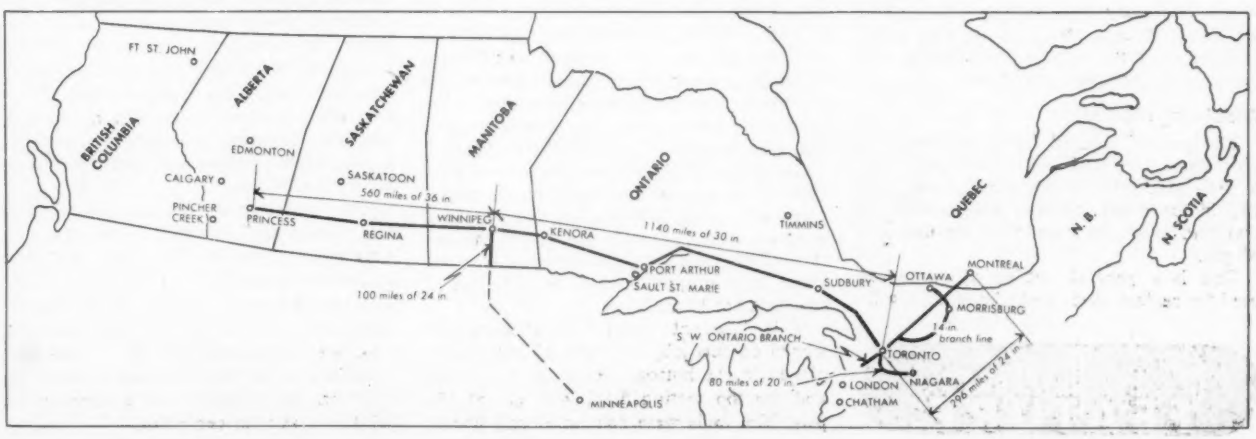
In 1949, the Gas Resources Preservation Act was passed in Alberta to effect preservation and conservation of the oil and gas resources of the province. It stipulated that no gas may be removed from the province unless a permit is granted by the Petroleum and Natural Gas Conservation Board upon its finding that such gas is surplus to the present and future needs of the people of Alberta.

Thus it was that Trans-Canada found itself allocated fixed quantities of natural gas from specifically defined fields. These quantities and fields were selected after due consideration had been given to the present and future needs of the province, the production and conservation practices and the extremely diversified characteristics of the natural gas found throughout the province.

Although both companies, which eventually merged, had grid gathering systems planned and engineered, the Province of Alberta felt the interests of the province could best be served by the Alberta Gas Trunk Line Company which is set up by special act. Therefore, instead of Trans-Canada going to the producers' wells or fields it found itself in the unique position of having to purchase from the producer, who was to bring his natural gas to the facilities of the Alberta Trunk Line system, and from whence Trans-Canada would take it at what is known as the "Saskatchewan Gate," a point virtually on the Alberta-Saskatchewan border in the Southern part of the province.

The complexities of construction, operation, gas treating and measurement, and communication are apparent when one considers the coordination and planning thus required of the producers, the Trunk Line, and Trans-Canada.

Proposed route for pipe line to take Alberta's surplus natural gas to Eastern Canada and Mid-Western United States.



How Wells in Underground Storage Areas are Prepared for Service

by **Palmer H. Montgomery**
Storage Engineer
United Natural Gas Company

CERTAINLY, underground storage is an important gas industry technology that has helped some utilities meet the peak-period demands that are coincident with low temperatures.

The expansion of activity in underground storage is moving ahead at a rate that gives promise of more-and-more gas for more-and-more utilities—at times when transmission line capacities are not adequate.

This article will deal with some of the practical problems encountered in construction of an underground gas storage in one depleted Oriskany sand field. This storage was designed for maximum formation pressures of 2,200 psi, which was the original rock pressure of the pool. The storage will have a minimum deliverability of 225 MMcf per day when the storage contains the minimum of active gas. The cushion gas is estimated to be 22,500 MMcf and the active or top gas will be 22,500 MMcf, when the storage is filled to capacity.

Because the storage will be operated at such high pressures, and because so many of the wells were abandoned and plugged with all sorts of materials, and because of serious caving formations, the construction of this storage presented a great many unusual and interesting engineering problems.

These wells, when originally drilled, were usually equipped with 8⅝"OD 32# casing, set at average depths of 600′ to shut off fresh water, and 7" OD 26# production casing set at depths of 5,100 to 5,200 ft.

The lower 500′ of production casing was usually cemented. As the production declined, a great number of the wells were plugged and abandoned. At the time of abandonment, as much casing as possible was recovered by shooting or cutting the production casing just above the top of the cement, leaving a cemented casing stub in the hole.

The fresh water casing was also recovered, and brush, cement, and numerous other types of plugs were placed at various depths in the hole.

During the construction of the storage it was necessary to condition every active well and to resurrect and reclaim every abandoned well. Where reclamation was impossible, they were replugged.

Reclaiming old wells

The general method for treatment of an abandoned hole had one of two goals, (1) to reclaim it for an active storage well, and (2) in the event this was not possible, to seal and properly abandon it against loss of gas.

This is a general outline of procedure used for reclamation of an abandoned well:

1. Install new 8⅝" or 9⅝" casing to shut off fresh water.
2. Clean out hole through caving formations to point where old production casing was shot or ripped off.
3. Locate top of old casing stub.
4. Join new string, where possible, of 7" casing with old 7" stub.
5. Clean out hole through storage sand.
6. Install new string of 5½" or 7" casing, as production or flow casing.
7. Test production casing and complete hole to be used as active well.

To clean out to the original casing seat and rerun water casing, a small wheel-mounted cleaning-out machine was used. The hole was cleaned out to the casing seat through cement and other materials used for bridging. In several wells it was necessary to ream the hole to permit the casing to go to the casing seat, and in every old hole a new casing seat was made. Some trouble was encountered with gas pockets below bridges, and on one occasion the tools were blown out of the hole. After running new 8⅝" 32# casing or 9⅝" 36# casing it was cemented by the circulation method. Various types of lost-circulation materials were used, but none was successful in bringing fluid to the surface.

The top of the cement in the annular space outside the casing, generally found at approximately 300′ from the bottom of the casing, was located by a temperature survey.

After the water was bailed and the cement drilled out, a bridge was set a few feet below the casing to test for leakage of water.

One of several types of rigs was moved over the hole at this point. Although standard cable tool rigs were most frequently used, large spudders and other drilling machines were also used.

Several methods were used to combat caving formation. One method was the use of drilling compounds which were mixed with water and dumped from the top of the hole. This not only water-proofed the walls but also served as drilling fluid. Another successful method was to fill the hole with from 50 to several hundred feet of gel and clean out, using this fluid. A third method used was to cement back and redrill the section of the hole where caving was troublesome. Still another method was the use of the "cement bomb."

This "cement bomb," specifically designed on this job, consisted of dry cement placed in the bottom section of a cylinder and the top section filled with gas at 300 psig. The tools were run on a sand line to the desired depth where it was tripped, rupturing a disc. This released the gas pressure, forcing the dry cement out through a spray, dusting the wet walls of the hole, which action formed a thin layer of cement on the walls.

It was difficult accurately to determine the depth of the top of the stub and whether the tools were working inside or outside of it. Impression blocks were used extensively and the markings of the tools were closely examined after each run. Electric logs and magnetic logs were used to locate, where possible, its exact depth. Caliper surveys were run to point out whether the tools were working on the inside or outside of the old stub.

A bottom hole camera was devised for this project specifically to help solve these problems. At this point in the reclamation, a bottom-hole photograph was taken to determine the condition and what treatment should be given the top of the stub in order to prepare it for jointure.

Two methods were employed to make a jointure between the new string of casing and the old stub. "Sleeve" jointure generally consisted of running a string of new 7" on the bottom of which was welded a short sleeve of an ID greater than 7". As the pipe was lowered in the hole the sleeve telescoped over the stub of old original 7" left in the hole.

Frequently the top of the stub was off-center from the rest of the hole and it was necessary to make offsets in the guide so that it would enter the stub. Progress was followed with the use of impression blocks and bottom-hole photographs.

Before attempting to run a sleeve on the bottom of the new string of casing, a trial run was made with the sleeve on the end of the tools to make certain that the sleeve would go over the stub and a jointure could be made. If this method was found to be unsuccessful, a "mandrel" type jointure was made.

In either type of jointure it was frequently necessary to guide the new string so that it would line up with the stub and proper jointure could be made. This was accomplished by first setting a stone bridge or magnesium plug approximately 25′ inside the old stub. Then with a trip spear smaller size casing or magnesium pipe was lowered into the hole and into the stub and set on the bridge.

This pipe was of sufficient length to extend above the stub to a point where the hole was normal size. The lower end of this guide was pointed. New casing was lowered into the hole and guided by the smaller size casing to the top of the old stub. The guide pipe was then removed with a trip spear. A caliper survey was then run to make certain that the jointure was successful. The jointure was then cemented.

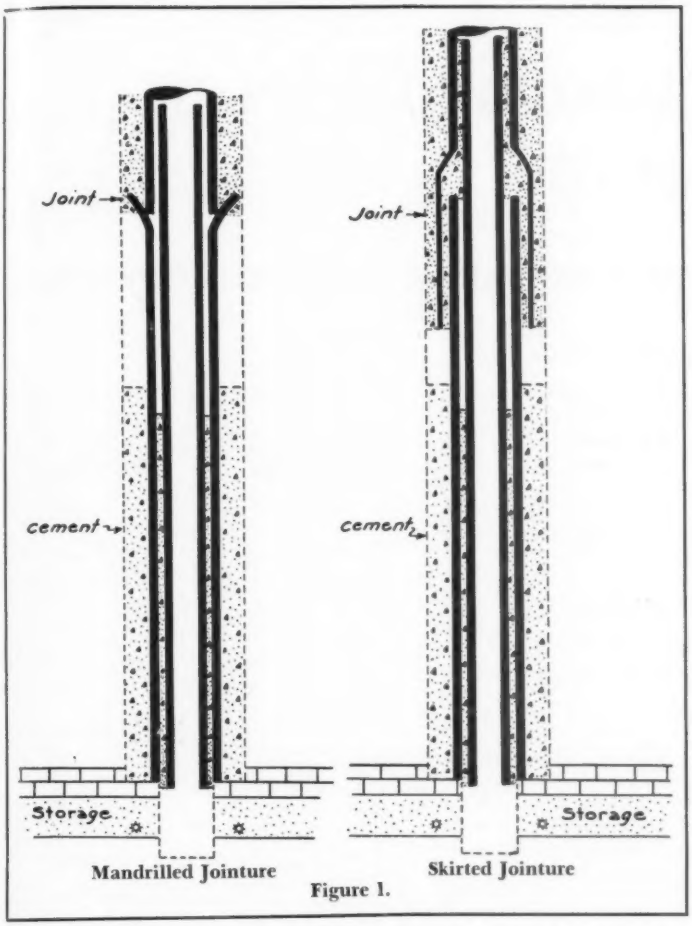


Figure 1.

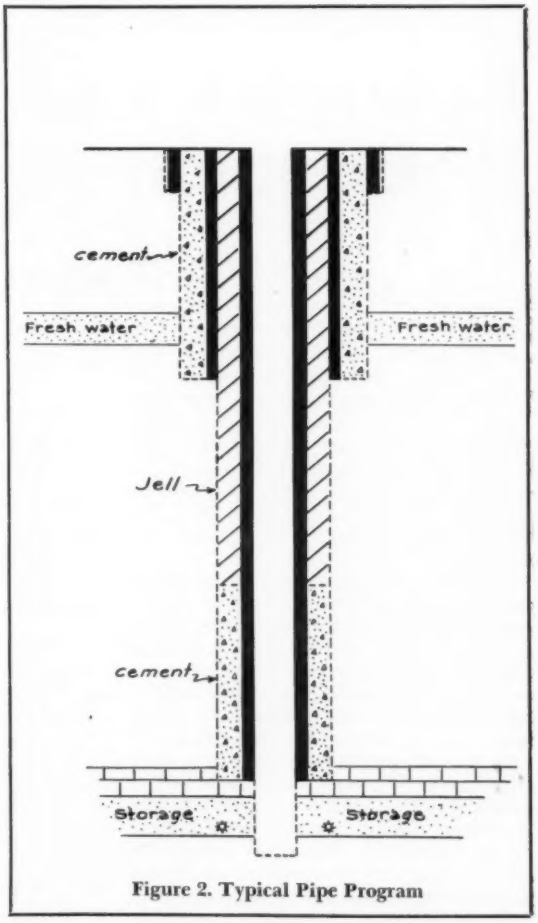


Figure 2. Typical Pipe Program

Figure 1 shows 2 methods of joining new casing with old pipe stub left in hole.

When the cap rock was reached a magnesium or cast iron plug was set in the bottom joint and the jointure cemented.

After the jointure was cemented, well surveys were run to detect any holes or irregularities in the casing and to determine if it were set in the proper formation, and old records were examined to make certain that the casing was adequately cemented. If so, the casing was tested for leakage with 2,500 psi air pressure. If the pressure test was satisfactory, the hole was completed and the combination of the new and old casing was used as a flow string.

To make certain that the casing would hold high pressure, each flow string was tested with air for leakage and blowouts before the well was completed. A cast iron plug was set in the open hole or a magnesium plug set in the bottom joint of casing and capped with approximately 5 gallons of gel. To insure against any possible chance of an explosive mixture during the air pressure test, the hole was purged of all natural gas. It was first loaded with 50 ft of water, then 125 lb of dry ice (CO_2) were broken into small pieces and put in the bailer. The bailer was run to the bottom. In approximately 20 minutes all of the dry ice had sublimated. This purged all natural gas from the hole.

As the dry ice sublimated, the gas mixture coming from the casing was periodically checked with an explosimeter to make certain that all natural gas was removed. After purging, the well was pumped to 2,500 psig with a portable 4-stage air compressor. After pressure reached 2,500 psig a drop pressure test was taken for 24 hours.

Replugging

Sometimes it was necessary to replug abandoned holes for one of several reasons such as (1) if the original production casing was in bad condition and too small to run a new casing inside, (2) if tools or other objects left in the bottom of the hole could not be removed.

When a well had to be replugged, this general method was followed:

1. Complete hole caliper survey determined volumes of cement and heavy mud needed.
2. Casing left in hole that could not be recovered, was perforated from top to bottom.
3. Face of storage sand was cemented and cast iron plug set directly above cement in cap rock.
4. Tubing was run to the top of the plug and the bottom 500′ of hole was cemented through it.
5. Tubing was pulled above top of cement and heavy mud-gel mixture pumped through it, filling hole to about 700′ from top.
6. Tubing was pulled above top of heavy mud-gel mixture, and hole cemented to surface.

Conditioning active wells

To condition wells which were still producing, small spudding machines were generally used. After the hole was cleaned out to its original depth, a caliper survey was run to detect any holes in the casing and to locate the bottom of the production string. A gamma-ray survey was also run to find depth and thickness of formations.

Some of these wells were drilled when the rock pressure of the producing pool had dropped considerably below the original and therefore the original cement job might not be satisfactory for high pressure storage operations. Since the expected operating pressures of this pool were planned to be as high as 2,200 psi, many of these producing strings were recemented.

Drilling new wells

After the reclamation of 15 abandoned holes, plugging 4, and conditioning 16 active wells, 21 new wells were drilled in this project. No unusual problems were encountered in accomplishing this. After installing and cementing the production casing in each new well, it was tested with air to 2,500 psi prior to drilling-in operations.

In drilling-in, special care was exercised to avoid the hazard of getting so large an open flow as to blow the tools out of the hole.

The use of lubricating equipment and loading the hole with fluid were resorted to, in some instances, when exceptionally large wells were anticipated.

Figure 2 shows the pipe program of a typical Oriskany storage well.

Economics of a Planned Meter Retirement Program

★ SECOND-PRIZE WINNER IN ROCKWELL CONTEST ★

by Douglas L. McLeod

Assistant Gas Engineer
Coast Counties Gas and Electric Company

At some time during the life of any machine, a point is reached where it is no longer economically sound to continue spending money for repairs and maintenance. This economic life span of a machine is almost always difficult to determine. The domestic gas meter is no exception.

One or more of several economically sound reasons may be given for retiring a machine, a tool, or an item of capital equipment. A unit may be retired due to development of improved alternatives and the consequent obsolescence of existing facilities. Some units are retired because they will no longer produce the service they are called upon to perform. But in most cases units are retired from active service as a matter of calculated cost economy. Where there is a choice of keeping an old meter in service or replacing it with a new meter, the final decision can be based on no firmer ground than "it will pay in the long run."

The major economic reasons for retiring a domestic gas meter classify into three categories:

1. Failure to perform;
2. Excessive rebuilding costs;
3. Obsolescence.

The first of these 3 reasons—failure to perform—is easily understandable. A domestic meter that fails to register, leaks, drags or in some way doesn't do the job expected of it should immediately be removed and, if it cannot economically be returned to productive service, retired.

Though many of the retirements due to failure to perform are clear cut and easily determined, many meters that should be retired with a "failure to perform" tag are not.

Research and statistics have proven that the average domestic customer consumes gas at very low rates a major portion of every day. Statistics show that 20 out of 24 hours a day the domestic gas meter is called upon to perform under extremely low flow rates; 0.5 to 5.0 cubic feet per hour (pilot flow). This consumption pattern makes accurate and dependable measurement essential at low flow rates.

Failure to perform at these *low* flow rates may not show up under normal meter proving practices since the incoming test check flow on the prover is set at a rate of 30 cubic feet per hour—6-to-60 times more flow than the average domestic use minimum.

Let us see what a D.R. (on low-flow only) costs the gas company per year in lost revenue. (Assume the cost of gas to the domestic customer would average $0.60 per Mcf.)

$$(20 \text{ hrs/day}) \times (365 \text{ days}) \times \left(\frac{0.5 + 5.0}{2} \text{ average low-flow rate}\right) = 20{,}075 \text{ cf}$$

20 Mcf used during one year not registered by the meter!

Lost revenue—$12.

It is logical to assume that the older a meter is the more likely it will develop internal leaks, binds, and other mechanical troubles that will prevent it from registering on low-flows. A gas meter consists of dozens of parts. Comparatively few of these parts are replaced and some are not even inspected under a normal meter overhaul procedure. Almost any one of these parts may, with age, develop into a trouble spot. Often it is the unseen wear or corrosion developed over many years in even the best of meters that finally lets go and puts an undetected D.R. on the records, substituting an uncollectible unknown for a cash account. It also appears logical to assume that the longer a meter operates after an overhaul, the more likely it will develop mechanical trouble and fail to register on *low*-flow rates.

Let us compare relative costs of lost revenue to be expected with a meter replacement program of 20 years versus that of a 30 year program (computed in Table I using the figure of $12 per year of lost revenue on meters which fail to register on low-flow).

It can be seen from Table I that overhauling meters 20 years old and older instead of replacing them would cost $0.052 per meter yer year in lost revenue during the remaining years of service. This loss in revenue should be considered a cost of maintaining the 20-year-old meters in service.

Modern quality control and design improvements have more than ever before built reliability and accuracy into the gas meter, but a machine has never been built that will run forever. A periodic replacement program is a must to eliminate the often undetectable defects of old age.

Excessive rebuilding costs

One of management's most prominent

Table I
COMPARISON OF LOST REVENUE DUE TO METERS THAT "DO NOT REGISTER" ON LOW FLOW
20-year vs. 30-year replacement program

AGE OF METERS*	% OF METERS IN FIELD THAT D.R.† AT LOW FLOW	LOST REVENUE PER METER
1	—	—
2	—	—
3	—	—
4	—	—
5	—	—
6	½	$0.060
7	½	0.060
8	½	0.060
9	1	0.120
10	1	0.120
Total—10 years		$0.420
11	—	—
12	—	—
13	½	$0.060
14	½	0.060
15	½	0.060
16	1	0.120
17	1	0.120
18	1½	0.180
19	1½	0.180
20	2	0.240
Total—20 years		$1.440
21	—	—
22	½	$0.060
23	1	0.120
24	1½	0.180
25	2	0.240
26	2	0.240
27	2½	0.300
28	3	0.360
29	3	0.360
30	3½	0.420
Total—30 years		$3.720

Average Yearly Lost Revenue Per Meter:

20-year replacement program $\frac{\$1.440}{20}$ = $0.072

30-year replacement program $\frac{\$3.720}{30}$ = $0.124

* Meters overhauled every 10 years

† D.R. in this case denotes meter that does not register on low flow rates only

Increase in lost revenue due to overage meters—per meter, per year—$0.052

and difficult problems is overcoming the inertia of past practices and re-evaluating the wisdom of historic policies and practices. The high and mounting cost of labor and materials required for meter repair and maintenance provides a fertile field for weeding out "gopher hole" expenditures that often produce a negative return.

During the past decade, the problem of early deterioration of meter diaphragms has become more and more acute. The advent of natural gas in an area formerly supplied with manufactured gas almost always means a speeding up of complete overhaul and diaphragm replacement in domestic meters. The complex gathering systems and long distance transporting of natural gas through the present day transmission network often means radical changes of physical characteristics in the gas fed into the distribution system. Yearly and even seasonal changes are not uncommon. Changing conditions such as these make for costly major repairs. There is no better time for a critical look at overhaul costs with economic modernization in mind.

Table II shows the total composite cost of overhauling meters on a 10-year change program as estimated from meter repair records and meter histories. Cost detail is shown in Appendix A.

In Table III the composite cost per meter per year for meters maintained in service from 10 to 40 years is shown; present day costs are used. In these tables, the class of repair is designated as follows:

Class "B" repair—Minor; top of meter removed only.
Class "C" repair—General overhaul with re-oiled diaphragms.
Class "D" repair—General overhaul with new diaphragms.

It appears, from Table III, that the optimum economic life of a meter falls on or near the 20th year—annual cost per meter per year reaches a minimum at this time. Further analysis indicates that a selective retirement program should be used. By retiring a meter when it is removed from service as a "routine" or an "old age" change and which (a) is in need of a class "C" or "D" repair and (b) has been in service 20 years or more would result in a cost per year of even less than the $1.141 shown in Table III.

Table II
METER OVERHAUL COST COMPARISON

First overhaul—after 10 years

CLASS OF OVERHAUL	(1) % OF ALL METERS OVERHAULED	(2) UNIT COST* PER METER	(1) × (2) COMPOSITE COST PER METER
"B"	80	$ 4.77	$ 3.816
"C"	15	8.50	1.275
"D"	5	14.44	0.722
Composite cost per meter			$ 5.813

Second overhaul—after 20 years

CLASS OF OVERHAUL	(1) % OF ALL METERS OVERHAULED	(2) UNIT COST PER METER	(1) × (2) COMPOSITE COST PER METER
"B"	3	$ 4.77	$ 0.143
"C"	18	8.50	1.530
"D"	79	14.44	11.408
Composite cost per meter			$13.081

Third overhaul—after 30 years

CLASS OF OVERHAUL	(1) % OF ALL METERS OVERHAULED	(2) UNIT COST PER METER	(1) × (2) COMPOSITE COST PER METER
"B"	20	$ 4.77	$ 0.954
"C"	38	8.50	3.230
"D"	42	14.44	6.065
Composite cost per meter			$10.249

* Refer to Appendix A for detail on meter overhaul costs by class of overhaul

Table III
COMPARISON OF ACTUAL METER COST PER YEAR
10-to-40 year retirement programs

	10-YEAR RETIREMENT PROGRAM PROGRAM	20-YEAR RETIREMENT PROGRAM PROGRAM	30-YEAR RETIREMENT PROGRAM PROGRAM	40-YEAR RETIREMENT PROGRAM PROGRAM
Initial cost of meter	$17.00	$17.00	$17.00	$17.00
1st overhaul cost	—	5.813	5.813	5.813
2nd overhaul cost	—	—	13.081	13.081
3rd overhaul cost	—	—	—	10.249
Total initial & overhaul cost per meter	$17.00	$22.813	$35.894	$46.143
Total cost per meter per year*	1.70	1.141	1.196	1.153

* Return on capital investment is not included in this calculation since there are factors which tend to balance it out under each of the four programs.

Obsolescence

Not all the factors involved in a decision to replace a meter can be reduced to dollars and cents. Sound reasons for replacing old meters have arisen from circumstances which are not related to the wearing out of the meter parts themselves. Recently improved methods, quality control, and design have outmoded the meter of a decade or so ago. A 30-year-old meter should be on the same shelf as the buggy whip.

The modern meter is light. A survey of the meter overhaul process in our shop shows that each meter has to be lifted at least 25 times. With an old style meter, this means a total lift of 875 pounds just to overhaul one meter! A modern meter cuts this backbreaking figure to a little over 300 pounds and improves the "broken toe" record in the same proportion.

The modern meter is accurate. It is "flow sensitive" at pilot loads, easier to work on, more streamlined in appearance, and has built-in corrosion resistance.

The modern meter is simply designed. It has simplified mechanical details, and a simple rugged case—simplicity that saves. Many improved parts, including oil impregnated bearings and better diaphragms, contribute towards the increased accuracy and dependability never before available at any price. These improvements alone add up to another good reason for replacing the obsolescents.

Conclusion

We have concluded that our obsolescent meter repair policies can and have reached a point of no return.

In our analysis of the economics of the

Turn to page 32—**METER RETIREMENT**

Price Indexes of Gas, Other Fuels and Electricity

Source: Bureau of Labor Statistics, U. S. Department of Labor (1947-1949 = 100.0)

	1954												1953	
	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Jan.
GAS														
Space heating	116.4	115.7	115.5	114.6	114.5	114.4	114.3	114.5	114.1	113.9	113.7	113.6	113.6	108.9
Non-space heating	110.6	109.8	109.7	108.8	108.8	108.9	108.8	108.9	108.8	108.8	108.8	108.8	108.8	106.4
Natural														
10 therms	100.9	100.6	100.5	99.4	99.5	99.9	99.7	100.0	99.9	99.9	99.9	100.0	100.0	98.3
25 therms	114.8	113.9	113.7	112.3	112.2	112.5	112.3	112.6	112.3	112.3	112.2	112.2	112.2	108.9
Manufactured														
10 therms	111.1	109.5	109.5	109.5	109.4	109.2	109.4	109.4	109.4	109.4	109.4	109.4	109.5	106.9
25 therms	110.5	110.3	110.3	110.3	110.2	109.4	109.6	109.5	109.6	109.6	109.6	109.6	109.7	107.8
Mixed														
10 therms	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.2
25 therms	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.0
All types combined														
10 therms	106.3	105.6	105.6	105.0	105.1	105.2	105.2	105.3	105.2	105.2	105.2	105.3	105.4	103.5
25 therms	114.7	113.9	113.8	112.7	112.6	112.7	112.6	112.8	112.6	112.6	112.5	112.5	112.5	109.6
ELECTRICITY														
Composite	105.5	105.5	105.2	104.9	104.8	104.8	104.5	104.5	104.5	104.5	104.4	103.8	103.8	104.4
SOLID FUELS														
Bituminous—All sizes combined	120.2	119.9	119.4	118.7	117.9	117.4	117.2	117.2	119.5	120.6	120.6	120.7	120.6	119.8
Anthracite—All sizes combined	129.8	129.2	128.5	126.5	126.4	124.7	124.1	123.1	130.2	135.0	135.0	135.0	135.0	135.9
PETROLEUM														
Fuel oil No. 2	124.2	121.2	121.0	118.8	118.5	117.7	117.7	118.1	120.6	122.1	123.2	121.9	120.9	116.6

Sales Indexes: Gas and Electricity

To Ultimate Consumers by Utilities and Pipelines

Sources: American Gas Association and Edison Electric Institute. Seasonally adjusted (1947-1949 = 100.0)

	1955	1954											1953	
	Jan.	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Jan.
Gas	206.0	198.3	195.7	190.0	171.7	178.8	180.6	180.2	176.2	174.9	183.2	182.5	194.8	173.6	172.9
Electricity	180.1	178.7	175.0	175.9	173.1	175.6	177.7	174.6	168.6	164.8	162.1	158.9	161.5	159.1	147.9

Residential Appliance Shipments

Source: Gas Appliance Manufacturers Association (000 units)

	1955	1954											1953	
	Jan.	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Jan.
Ranges															
Gas	155.1*	143.2	170.5*	206.7*	203.9	179.4	134.5	174.3	163.8	172.4	188.2	152.9	137.0	134.4	169.2
Electric	—	—	90.7	96.4	113.8	86.8	91.4	98.1	94.5	106.0	131.9	125.3	116.4	84.4	124.8
Water heaters															
Gas	198.3*	170.7	179.1	202.0	205.5	207.1	190.3	206.7	195.6	200.8	187.8	175.0	164.4	141.9	189.9
Electric	—	—	57.1	63.7	80.4	66.1	66.6	73.0	69.8	70.0	73.6	60.9	53.9	44.3	62.3
Furnaces, gas	46.8*	55.8*	71.7*	77.3*	82.0	75.4	53.1	57.3	49.9	43.6	36.6	31.6	31.0	33.5	31.1
Boilers, gas	3.2*	3.9*	7.0	10.8	10.9	8.9	6.0	6.2	6.0	4.3	3.9	3.0	2.9	3.1	2.7
Conversion burners	5.2*	7.7*	16.0	32.2	35.9	29.4	19.9	19.7	22.5	14.7	7.4	8.7	8.8	8.4	9.7

* Preliminary totals.

Index of Yields: Selected Utilities Stocks

Expressed as percentages

	1955		1954											1953
	Feb.	Jan.	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	May	Apr.	Mar.	Feb.	Jan.	Jan.
Transmission companies	4.01	4.25	4.27	4.40	4.40	4.17	4.17	4.25	4.04	4.08	4.15	4.17	4.25	4.21	4.04
Transm. & distrib. companies	4.87	5.00	5.08	4.69	4.70	4.61	4.67	4.88	5.01	5.01	5.11	5.27	5.39	5.39	5.02
Manufactured & mixed companies	4.48	4.57	4.88	4.72	4.38	4.16	4.26	4.36	4.45	4.46	4.67	4.68	4.66	4.66	4.87
Class "A" electric companies	4.07	4.13	4.20	4.37	4.46	4.36	4.31	4.31	4.60	4.64	4.70	4.68	4.92	4.92	5.08
Class "B" electric companies	4.55	4.68	4.72	4.69	4.77	4.74	4.70	4.78	4.83	4.94	4.94	4.93	5.01	5.14	5.19

This is a straight arithmetical index of comparative yields obtainable on a selected group of gas and electric utility industry common stocks.

The companies comprising this index have been selected by the AMERICAN GAS JOURNAL as providing a representative cross-section of each industry, from the standpoint of geographical diversification and of the relative importance of the individual companies in their areas.

No effort has been made to weight the average to give effect to changes in capitalization or in dividend rates because the yields afforded on the issues reflect such changes. The index is designed to show the rate of return and not necessarily market movements on the stocks comprising it.

This index is compiled from: natural gas transmission companies, 5; natural gas transmission and distribution companies, 5; manufactured and mixed gas companies, 4; class "A" electric companies, 4; class "B" electric companies, 5.

Money Market in Process of Being Tightened Further

by **John F. Falvey**
Financial Editor

CORPORATE borrowers planning to come to market in the early future seemingly will have to pay more in the form of interest cost than they may have anticipated, since the money market is in the process of being tightened further. The Federal Government has done its part in tightening credit through recent reductions in bill holdings by the Federal Reserve banks, by raising margin requirements on stock purchases, and by taking approximately two billion dollars out of the market through the offering of long-term bonds as part of its March 15 financing operation.

Corporations and municipalities to date this year have taken another billion dollars out of the market through new issue offerings, and by the end of the spring they are expected to account for another billion.

The sum total of all this is a likely shortage of available investment funds of about $1500 million in 1955, according to best calculations at the moment. The development is causing market observers to question whether the flow of new issues into the market over the next several months might not be improperly spaced to produce the best results.

"The near term problem for both municipals and corporates," in the opinion of New York Hanseatic Corporation, dealer in all types of securities, "is one of continually facing a supply of new issues coming to market at a pace in excess of accumulation of funds for investment. The new issues will have to be priced below prevailing rates in order to attract buyers, and we may find a build-up of inventories in dealer positions.

"Behind the scenes, however, there is the longer range consideration of a probable letdown in future construction expenditures by business."

Agreeing substantially with these conclusions but going a bit deeper in detail, the New York investment firm of Salomon Bros. & Hutzler holds to the belief that an increase in borrowings from the commercial banking system and a trend toward firmness in interest rates is in prospect. It adds, however, that should some of the more important sectors of the economy experience a slackening in activity later this year, the pattern of interest rates could be altered.

Long range funds total $33.6 billion

The study places total long-range funds for 1955 at an estimated $33.6 billion, of which $20.9 billion would represent new funds and the remaining $12.7 billion would accrue from funds requiring reinvestment as a result of debt amortization and repayment. With the demand for long-term funds estimated at $35.2 billion, the result would be a $1.6 billion deficiency in long-term investment funds.

In compiling these estimates, no provision has been made for the newly proposed highway program, since it is rather doubtful that public financing for such a program could be arranged this year. Treasury operations, whether to raise new money or to refund maturing debt, also have been excluded. It might be added, also, that any serious change in the international situation would invalidate these estimates.

How much further tightening of interest rates is in prospect is anyone's guess at the moment, although some of the uncertainties prevailing have been recognized in the increase of approximately ten basis points that has taken place in yields on top grade and sound corporate bonds in the current year to date.

The question in many observers' minds is how much further the Treasury and Federal Reserve authorities may go in tightening credit. To go too far would be to make the cure possibly as bad as, if not more dangerous than, the symptoms that necessitated it. But it is a fact that economists recently have been leaning more strongly to the belief that the threat of a boom or bust pattern is being reflected in the continuing very sharp rise in home building and mortgage borrowing, not to mention stock prices. To halt any runaway and preclude the necessity for far more aggressive measures at some later date, mild but persistent pressure by credit control measures to restrain boom tendencies would seem to constitute the best antidote.

In the event further credit restraining measures are considered necessary over early future months, the belief expressed by Dr. Jules I. Bogen of New York University is that they will take the form of any or all of the following: (1) An increase in the rediscount rate from 1½ per cent to 1¾ per cent, (2) further reduction in Federal Reserve holdings of Treasury bills to absorb bank reserves, (3) further moderate rise in margin requirements on stock purchases, and (4) possibly an effort to have Congress implement the President's proposals that terms of home mortgages be made flexible, so that they may be tightened as well as liberalized in response to fluctuations in the volume of current mortgage borrowing.

This last-mentioned step might be witnessed in the event housing starts should continue at their recent break-neck pace and make 1955 an all-time record high year in home construction, despite the downturn that has taken place in the rate of family formation.

Underlying the concern of monetary authorities with respect to the building boom is the growing view that it is proceeding at a rate that cannot be maintained, and that a certain proportion of it is being borrowed from the future. A later letdown in home construction, they fear, could very well lead to a broad business recession.

Opinion in the mortgage banking field is divergent as to whether concern over the sharp rise in the rate of mortgage borrowing is justified. Some maintain that the boom will be self-limiting; others hold that institutional lenders of mortgage funds will become more selective in accepting mortgages, both because of the very rapidity of the increase of such paper in their portfolios and because of the growing proportion of loans with little or no down payment; and still others aver that population shifts and rising standards of living justify the current high rate of building activity.

Monetary authorities have sounded a clear warning, however, that they will not await the play of natural forces to prevent a home building boom which could undermine the future stability of the country's economy. They can be depended on to keep a close weather eye on building and mortgage lending statistics as a guide to credit policy.

From the standpoint of corporate developments the economic picture for investors has been encouraging. Final 1954 quarterly net profits after taxes, according to estimate of the Council of Economic Advisers, was at an annual rate of $18.8 billion, a figure 8 per cent larger than results for the September quarter last year and the best profit showing for any quarter since the September quarter of 1953.

Upward trend continues

The business trend continues upward and further profit increases in the initial quarter of 1955 are expected to bring the total of corporate profits above a $19 billion annual rate, for the first time since back in 1950.

In addition to increasing, the corporate profits also are improving in quality. Inventory profits are practically non-existent in the current profits picture, and sharply rising depreciation allowances—expected to reach $14 billion in 1955 against $12.5 billion in 1954—constitute a strong measure of support to the cash flow of corporations entirely aside from retained earnings.

Viewed in relation to earnings, the stock rise over recent months has not been as great as they seemed to be at first glance. While representative common stocks at last analysis were selling at an average of 14 times earnings based on profits for the first nine months of 1954, they were only 13 times the profit rate witnessed in the final quarter; and the ratio could drop further this year even without any drop in equity share prices, thanks to the further increase in corporate profits now in prospect.

In numerous instances the earnings gains being reported by industry are not traceable to increasing sales or revenues, but to increasing close and effective control over expenses. This is coming about through use of newer and more efficient equipment, elimination of waste, and realization of economies through mergers and plant ac-

Turn to page 31—**FALVEY**

INDEX OF YIELDS:

SELECTED UTILITIES STOCKS

See bottom of facing page.

American Gas Journal FEATURE

Can an Employer Prevent An Ex-Employe from Working for Competitor?

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AN official of a gas corporation has asked: "What form of a contract is valid and actually enforceable that will prevent an employe from taking employment with a competitor? Often our corporation expends considerable time, effort, and money in training a raw employe in its sales department to a point where he can render valuable services, and then he takes a job with a competitor. It seems that we should have some protection against this. Can you suggest a solution? Also, can we obtain a temporary injunction to restrain an old and experienced employe from soliciting business from the same customers he sold while with our corporation?"

The answer: According to a recent high court decision, it is useless for a gas corporation to file a suit asking the court to grant a "temporary" injunction to prevent an ex-employe from soliciting business for a new employer from customers he served for the gas corporation, his former employer.

In Western Gas & Power Company v. Nash, 272 Pac. (2d) 314, the testimony showed the following facts: Western Gas & Power, a corporation, was organized by John R. Nash, his wife, and one Blewett. Later Hansen acquired two-thirds of the outstanding stock of the corporation.

At all times after incorporation until 1953 Nash was president, general manager, and one of the directors of the corporation. At a stockholders' meeting held in 1953 Hansen was elected president and John R. Nash, vice president.

In other words, Nash, who had been president of the corporation for several years, was elected vice president, and Hansen who owned two-thirds of the corporation's stock was elected president. On the following day Nash resigned as vice president and director and severed his connection as an employe. Previously Nash, while acting as manager of the gas company, personally contacted most of its customers and serviced the accounts. Also, Nash assisted in selling gas appliances and equipment and the installations.

Soon after Nash severed his connections with Western Gas & Power, he took employment with a competitor. Then he began to solicit customers of Western Gas & Power, advising his old customers that he was no longer in the employ of Western Gas & Power and sought the business for his new employer. As a result of his contacts and solicitations several of the customers moved their accounts from Western Gas & Power. The evidence indicates that after Nash severed his connections with Western Gas & Power, he was very successful in selling gas appliances and equipment to his old customers of Western Gas & Power, and also to new customers.

Western Gas & Power filed suit and asked the court for a temporary injunction and, to enjoin and restrain Nash for a period of three years from soliciting or dealing with any of the customer accounts that Western Gas & Power had on September 7, 1953, and for damages in the sum of $5000. On the same day the court issued an order to "show cause" why a restraining order and injunction should not be made. During this hearing Nash refused to testify and neither agreed with nor disagreed with the evidence introduced by the counsel for Western Gas & Power.

It is interesting to observe that the lower court refused to issue the temporary restraining order. Western Gas & Power appealed to the higher court, which refused to reverse the lower court's decision, saying:

"The granting or denying of a temporary injunction is addressed to the sound discretion of the trial court, to be exercised according to the circumstances of the particular case and the exercise of such discretion will not be disturbed on appeal unless a clear abuse thereof is shown. An entirely different situation may be found to exist upon the evidence adduced when the case is tried on its merits."

This court went on to explain that in cases of this kind the complaining ex-employer should not sue for a temporary injunction to prevent an ex-employe from soliciting business from customers of the ex-employer, but the suit should be filed on the basis, with all relevant testimony, that the ex-employe should be permanently restrained from using unfair tactics in soliciting business for his new employer from old customers served while in the employment of the ex-employer. In this respect, the court said:

"The briefs of the parties set forth many matters which will have to be decided by the court when the case is tried on its merits, but which should not and will not be discussed here. This court will not prejudge such questions and will limit its decision to the sole and only question presented on the present record; that question is whether the lower court abused its discretion in denying an injunction pendente lite."

Hence, a gas corporation whose officials believe an ex-employe is unfairly soliciting old customers, or attempting other unfair transactions, should prepare at once the suit and testimony in detail, and ask the court for a permanent injunction. And generally speaking the gas corporation will win the suit.

The Law Is Settled

Modern higher courts consistently hold that an employe may take competitive employment if he is honest in his dealings and does not attempt to take undue advantage of his ex-employer, and did not sign an agreement to not take competitive employment.

For illustration, in Padover Company v. Axelson, 167 N. E. 301, it was disclosed that there was no written contract between an employer and his employes preventing the employes from entering the employment of a competitor.

Three of the employes resigned their jobs and formed a competing company. These men began soliciting business from the former patrons of the former employer and were successful in obtaining from 33 to 50 per cent of the customers whom they served while in the employ of their former employer.

They did not copy the list of customers from their former employer, but simply solicited business from all prospects generally.

The former employer filed suit to restrain the employes from continuing their business. It is interesting to observe that the higher court did not hold the employes liable, and refused to grant an injunction, stating the following important law:

"There is a plain distinction between cases where an agent or clerk leaves one employer and uses his skill and knowledge of the trade in the service of another, and where there is a violation of trust and confidence and confidential information, secured solely through his employment, which is used to the injury of his former employer. . . . These appellants (employes) had the right to earn a living among the people to whom they were known, and they should not be enjoined from going into business for themselves, or entering the employ of another, and seeking the patronage of business acquaintances who became such in the course of a previous employment. . . . No written or printed list of the plaintiff's (Padover's) customers was copied, and no information confidentially acquired as to the details of the plaintiff's business was used by them."

For comparison, see Empire v. Lozier, 130 Pac. 1180. Here it was shown that an employe endeavored to utilize a list of the names of his ex-employer's customers. The court promptly held this act illegal, saying:

"There can be no question . . . but that the employe's agency was one of trust and confidence. . . . The names of the customers of a business concern whose trade and patronage have been secured by years of business effort and advertising, and the expenditure of time and money, constituting a part of the good will of a business which enterprise and foresight have built up, should be deemed sacred."

Also, in the leading case of Colonial, 138 Atl. 47, in holding it unlawful for a discharged or ex-employe to use a list of names copied from a former employer's books, or otherwise obtained, the court said:

"When a selected list has been built up by labor and expense on the part of the em-

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ployer and is secretly imparted to a specific employe for a specific purpose it is not a part of the employe's general knowledge which may be freely used anywhere."

In another leading case Steves & Company v. Stiles, 71 Atl. 802, it was shown that an employe made a list of names and addresses of his employer's patrons. The employe quit his job and established a competing business. The former employer instituted legal proceedings against the past employe, and asked the court to restrain his using the list of names of the customers on the grounds that the ex-employe had "surreptitiously," fraudulently, and without the knowledge of the employer copied the names of a great number of patrons, with their postoffice addresses.

It is interesting to observe that the court granted an injunction restraining the former employe from using or keeping in his possession the list of names, and said:

"The respondent (employe) could have no more right to copy records made by himself, while acting for the employer, than he would have to copy any other records to which he had access."

Heavy Damage Allowance

A few weeks ago a higher court held that all sales managers are impliedly obligated to serve past employers faithfully, and not divulge trade secrets, or unfairly acquire secret profits.

For illustration, in A. Hollander & Son v. Imperial Corporation, 66 Atl. (2d) 319, the testimony showed facts as follows: One Singer took employment with a company as a sales manager. He was paid $7500 a year under a written contract. After working for several years Singer secretly organized a competing company, the Imperial Corporation. Singer kept in telephone communication with the latter company but did not appear at its plant for fear of disclosing his interest in the competing company.

The employer sued Singer and asked the court to compel Singer to repay $15,000 salary received during the past two years during which time the Imperial Corporation was in operation. The higher court held in favor of the employer and said:

"The record establishes beyond doubt Singer's infidelity to Hollander (employer) through failure to serve faithfully and exclusively. Singer is not entitled to retain the salary paid to him amounting to $15,000."

Contract Is Valid

Modern higher courts consistently hold that a contract between an employer and employe, wherein the latter agrees not to enter into a competing business, or engage himself with a competing firm, is valid and enforceable provided the restrictions are reasonable.

For instance, in the leading case of Eigelbach v. Boone, 287 S. W. 225, it was disclosed that a contract existed between an employe and his employer which contained a clause, as follows: "I further agree that, in the event my employment is terminated for any reason, I will not injure or attempt to injure your business or the business of your clients or associated interest by communicating with or otherwise getting in touch with your customers, directly, or indirectly, in any way, form, or manner; but, on the other hand, by my conduct and action I will at all times do all I can to make friends for you. I further agree that, in the event of termination of my employment, for any reason, I will not engage in the same or similar line of business in the same city, or county, either for myself or another person, firm, or corporation, for the period of one year immediately following the termination of my employment by you."

Soon after the employe terminated this employment he became engaged in a competitive business.

In subsequent litigation the court promptly granted a permanent injunction against the ex-employe remaining in the competitive business.

On the other hand, it is important to know that a contract obligating an employe not to enter into a competitive business, or hire himself to a competitor, must not contain unreasonable stipulations. Under no circumstances should the contract specify territory of greater area than is actually required adequately to protect the gas corporations. And the period of time for which the employe is bound by the contract should be not more than five years. See Smith, 6 Atl. 2510.

Unreasonable Contract Is Void

All higher courts consistently hold that all contracts are void that unreasonably prevent an ex-employe from earning a living for his family and self.

See Diamond v. Roeber, 13 N. Y. 419. Here a contract was held void that specified that the employe would not "at any time within 99 years enter into a competing business or become engaged with a competing firm in any of the States or territories of the United States."

In this instance, both the duration of the obligation and the extent of the territory were unreasonable and unnecessary to the employer's adequate protection, so the higher court held.

Nevertheless, as above indicated and held by late higher courts, a gas corporation may by use of the above listed clause in an employment contract restrain employes permanently from using unfair tactics or taking employment with competitors for one to five years.

Plate Shutoff Avoids Injuries and Saves Money

ERNEST BAKER, foreman in the construction and maintenance department of the Kansas City, Missouri division of The Gas Service Company, has used his inventive ability to minimize a hazardous situation and reduce the company's construction and maintenance expense.

Baker's invention is a plate shutoff system used to control gas when it is necessary to cut off the end of a main that has no valve or other means of controlling the escaping gas.

His method works this way:

A cut is made from the top, half way through the main, with a hack saw. Then a sheet metal disk, cut to conform with the inside curve of the pipe (See "A" in the illustration), is inserted in this slot. This disk thus holds back most of the gas pressure.

The end of the gas line is then cut off and a short section of pipe and a valve of the proper size are attached to the cut off end by means of a dresser coupling. The coupling is bolted, the valve is closed, and then the sheet metal disk is removed from the saw cut.

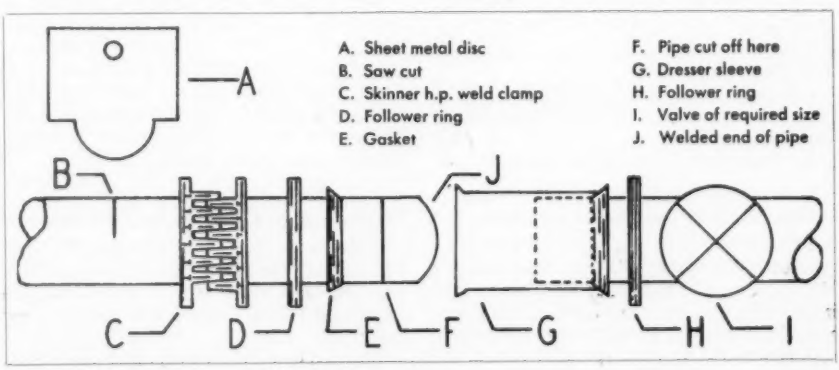
Next step is to cover the cut in the main. This is accomplished by the use of a Skinner high pressure weld clamp, which should be fitted before cutting off the end of the main. An alternate method of covering the cut is through the use of a Dresser coupling that has previously been placed over the cut off end of the line.

The plate shut off system can also be used when it is necessary to install a tee in an existing line. In this method, plates are put on both sides of the location where the tee is to be installed, and thus, the gas flow is controlled from two directions.

Other variations in this process include making the plate cut on an angle so the force of the gas on the plate tends to push the plate against the main and more effectively stop the gas leakage.

In using this method where pressures are so high that the plate might possibly be bent, two plates are used in conjunction with a blow off valve to decrease the pressure. In this application, the upstream plate is drilled with an orifice opening of sufficient size so the blow off valve can be used to control pressure between the two plates.

Sectional drawing showing the use of plate shut off system invented by Ernest Baker.



FEDERAL Power Commission

Motions to Dismiss Northern Natural's Import Application are Denied

The Commission has denied motions to dismiss applications by Northern Natural Gas Co. requesting authority to import natural gas from Canada to serve markets in the midwestern United States.

The motions to dismiss were filed by 8 of Northern's utility customers, and were joined in by coal, labor and railroad interveners. The latter interveners also sought to have related applications by Northern, involving other facilities, dismissed.

FPC said the motions involve a final determination of the proceedings.

Northern is proposing to construct new facilities to enable it to purchase gas from Trans-Canada Pipe Lines, Ltd. These facilities, estimated to cost $32,813,000, would add approximately 133 MMcf per day initially to Northern's system, including 100 MMcf from Canada and 33 MMcf from existing sources in the United States.

The motions to dismiss were based, among other things, on the contention that Northern had failed to make a showing with respect to the feasibility of the proposed Trans-Canada pipeline project.

Commissioner Nelson Lee Smith filed a separate concurring statement in which he cited certain "glaring deficiencies" in the record of the proceedings, and urged that they be corrected. Commissioner Smith said that he was "strongly impelled" to vote to sustain the motions to dismiss the applications relating to the import of the Canadian gas. However, he pointed out that the hearings "have gone forward, at very considerable expense to all concerned, and we are urged to keep the proceedings alive lest dismissal might sound the death knell of the Trans-Canada project, to the possible economic detriment of both Canada and the United States."

New FPC Pipeline Map

The Commission has issued a December 1954 revision of its map, "Major Natural Gas Pipe Lines" in the United States. The map supersedes the June 30, 1954, edition. The map, approximately 13" x 19", is in 4 colors. It shows major existing pipelines, those under construction or authorized but not started, and proposed lines pending before the Commission.

Copies may be purchased from Publications division, Federal Power Commission, Washington 25, D. C., at 25¢ each. The order number is FPC M-42.

Mid-Georgia Authorization Revoked

The Commission has revoked authority granted in December 1953 for Mid-Georgia Natural Gas Co. to render service to Covington and Oxford, Ga., because the company has failed to comply with conditions attached to the authorization.

The revocation of the authorization will not deprive the communities of gas service, since Transcontinental Pipe Line Corp. was directed to retain gas to serve the two towns.

Producers' Suspended Rate Increases Made Effective

Orders have been issued making effective 4 suspended rate increases, totaling $1,437,697 per year, by 2 independent producers, provided the companies agree to refund amounts subsequently disallowed.

Three of the increases are by Phillips Petroleum Co. and the fourth is by Sunray Oil Corp.

Phillips' first increase amounts to $151,233 annually, and affects Transcontinental Gas Pipe Line Corp. The second increase totals $353,770 per year, applicable to Michigan-Wisconsin Pipe Line Co. Phillips' third increase amounting to $918,000 yearly also is to Michigan-Wisconsin.

Sunray's increase totals $14,694 per year and affects Transcontinental.

Merger Application Filed by Texas Gas

The Commission has accepted for filing applications requesting authority for the merger of 2 wholly-owned subsidiaries into Texas Gas Transmission Corp. The subsidiaries, Louisiana Natural Gas Corp. and Texas Northern Gas Corp. are both primarily engaged in the acquisition of gas reserves in the Louisiana Gulf Coast area for delivery to Texas Gas.

Texas Gas Files Expansion Application

Texas Gas Transmission Corp. has filed an application requesting authority for the construction of about 207 miles of pipeline and 22,600 hp in compressor capacity on its transmission system to increase firm deliveries to The Ohio Fuel Gas Co.; to serve the entire estimated requirements of Horseshoe System, Indiana Gas & Water Co.; to serve the increased firm requirements for the 1955-56 winter of present customers, other than Ohio Fuel. Total estimated cost of the project is $17,498,519.

Transcon Gets $4-million Increase; Producers Get Related Increases

The Commission has issued an order making effective a suspended $4-million wholesale rate increase proposed by Transcontinental Gas Pipe Line Corp., provided the company agrees to refund any amounts subsequently disallowed.

In a separate order, the Commission allowed increases totaling $2,465,000 annually by Union Oil Company of California and Louisiana Land and Exploration Co. to become effective subject to refund. This entire increase affects Transcontinental. Union Oil and Louisiana Land are independent natural gas producers.

Transcon Gas Allocated to 2 NY Cos

Tennessee Gas Transmission Co. has been directed to supply gas to Central Hudson Gas & Electric Corp. and Rockland Light and Power Co., both in eastern New York.

The 2 New York companies intervened in proceedings on an application by Tennessee to construct new facilities. Home Gas Co., which supplies gas to the 2 utilities, also intervened in the Tennessee proceeding, in opposition to the requests of Central Hudson and Rockland.

The Commission's order directs Tennessee to sell a maximum of 5 MMcf daily and 1,287 MMcf annually to Rockland during the period to December 1, 1957, and not more than 7 MMcf per day or 1,800 MMcf per year thereafter. Deliveries to Central Hudson are limited to 4,500 Mcf daily and 1,100 MMcf annually through December 1, 1957, and not in excess of 6,500 Mcf daily and 1,600 MMcf per year thereafter.

Transcon's Rate Increase Suspended

The Commission suspended a proposed $2,176,000, or 3.3%, annual wholesale rate increase by Transcontinental Gas Pipe Line Corp. The increase is alleged to be based on higher purchased gas costs resulting from rate filings by 5 of Transcontinental's suppliers.

Allow $9.7 Million Increase for 6 Co's

The Commission has issued orders allowing wholesale natural gas rate increases, together amounting to more than $9.7 million annually, by six interstate pipeline companies to go into effect, subject to the refund of any amounts subsequently disallowed by FPC.

One of the increases, by Northern Natural Gas Co., totaling $8,128,400 per year, will be effective as of December 27. The other five were allowed to go into effect as of December 15. The five companies, and the amounts of their increases, are: East Tennessee Natural Gas Co., $274,000; Alabama-Tennessee Natural Gas Co., $74,000; Tennessee Natural Gas Lines, Inc., $184,000; Lake Shore Pipe Line Co., $46,000; and Hope Natural Gas Co., $1,060,000.

Authorize Southern Natural to Sell Gas for Boiler Fuel to Generating Company

A presiding examiner has filed a decision authorizing Southern Natural Gas Co. to sell natural gas for use as boiler fuel to South Carolina Generating Co.

Under the authorization, Southern Natural will build 2.2 miles of 8⅝ inch pipeline near North Augusta, S. C., extending to Generating Company's Urquhart power plant. Estimated requirements of the generating plant are a maximum of 60 MMcf of natural gas per day, with an annual total of approximately 10,072 MMcf.

Panhandle Eastern's Revised Sheets for $7,134,469 Rate Increase Go into Effect

Revised natural gas tariff sheets, providing for a $4,880,284 reduction in a proposed annual wholesale rate increase by Panhandle Eastern Pipe Line Co. have been allowed by the Commission to go into effect, subject to refund, as of January 1.

The revised sheets, which increase the company's rates by $7,134,469 annually, were filed by Panhandle in substitution for tariff sheets, providing for a $12,014,753 increase, which were disallowed by FPC last December.

Gas Industry NEWS

SOUTHERN GAS ASSOCIATION HOLDS ACTIVE SAFETY ROUND-TABLE

At Southern Gas Association's recent accident prevention round-table conference in Jackson, Miss., 28 representatives from 17 companies participated.

The round table was divided into 3 sessions: a general session for discussion of problems of interest to both distribution and transmission companies; separate sessions on distribution and transmission.

The chairmen of the sessions were W. O. Lape (seated, 4th from left), Texas Gas Transmission Corp., general; J. W. DeLatte (seated, 3d from left), United Gas Corp., distribution; and M. H. Clements (seated, 5th from left), United Gas Pipe Line Co., transmission.

Some of the topic headliners were supervisory safety training, subjects for future training film, reduction of back and eye injuries, and annual physical examinations for executives.

PLANS RELEASED FOR AGA 1955 CONVENTION IN LOS ANGELES

Plans are progressing rapidly for the first American Gas Association Convention on the Pacific Coast, according to R. R. Blackburn, vice president, Southern California Gas Co., and chairman of the 1955 AGA Convention Committee. The 37th annual convention of AGA will be held jointly with the Pacific Coast Gas Association's 62nd annual convention October 17, 18, and 19, at Los Angeles. Details on both convention programs will be announced as far in advance as possible.

General sessions meetings will be held at the Statler Hotel, which also has been designated as headquarters for the general management and the accounting sections of AGA. The residential gas, the industrial and commercial gas sections will hold meetings and maintain headquarters at the Ambassador Hotel. The operating section will establish its headquarters and hold its meetings at the Biltmore Hotel.

A committee headed by Robert A. Hornby, executive vice president of Pacific Lighting Corporation, is arranging a program of stimulating and informative meetings with talented speakers. These meetings include the general sessions, sectional programs and the joint PCGA-AGA luncheon meeting on October 19.

OBSOLETE HEATING EQUIPMENT COSTS INDUSTRY MILLIONS

American industry loses millions of dollars unnecessarily every year by using obsolete industrial heating equipment that could profitably be replaced by newer and more efficient equipment.

That's the conclusion of Carl L. Ipsen, executive vice president of the Industrial Heating Equipment Association. Ipsen's remarks were made in a report to the Board of Directors of the trade group at its annual meeting in Detroit.

"The best estimates available conservatively place the percentage of obsolete industrial furnace and industrial heat treating equipment in use in American industry today at 35 per cent," Ipsen said.

"All of this—and a considerable amount more—could profitably be replaced with newer and more productive equipment."

New officers elected by the association are: Horace Drever, president of the Drever Company, Philadelphia, president; Elton Staples, executive vice president of the Hevi Duty Company, Milwaukee, vice president; Carl L. Ipsen, executive vice president, and R. E. Whittaker, secretary of the Swindell-Dressler Corporation, Pittsburgh, treasurer. Retiring president, L. H. Gillette, of the Westinghouse Electric Corporation, Meadville, Pennsylvania, was elected to the executive committee.

GAS TEACHING KITS TO SCHOOLS

Every industry looks to the youth of America for future progress through science. Young men and women in our schools are being exposed to various academic studies with the hope that they will find their fields of endeavor.

To aid in carrying out this aim, Brooklyn Union Gas Company plans to distribute teaching kits about natural gas to science teachers in various high schools, junior high schools, and vocational schools within its territory.

All materials have been prepared under the direction of the American Gas Association Educational Service Committee.

SEATTLE GETS READY FOR NATURAL GAS

A $1,200,000 gas distribution system expansion has been approved by the Seattle Gas Company board of directors. This is the company's first major expenditure during 1955 in preparation for the arrival of natural gas.

"New 12 and 16-in. mains will be laid immediately through Seattle's industrial area extending from Jackson Street to our south Seattle station in Georgetown," said an executive of the company. From this new distribution system new gas mains will be laid to service west Seattle and south Seattle residential areas.

"As the natural gas pipe line schedule becomes more definite, we plan to start construction on a transmission main from our south Seattle city gate, located southwest of Renton, to our Georgetown distribution plant," the company official said. "We will also build a transmission main from the north Seattle city gate, near Bothell, to our Lake Union plant."

Also scheduled for 1955 are several mains to various greater Seattle new residential communities. Other 1955 expansion projects are to be scheduled later.

This appropriation is the second major step in the Seattle Gas Company's projected $15,000,000 expansion program during the next five years. The first step was taken last summer when a $90,000 8-in. main was laid from Crown Hill to Ballard which will eventually tie-in with the new natural gas distribution system. Seattle Gas Company officials expect the natural gas pipe line to arrive in Seattle by late spring of next year.

$35,000,000 CONSTRUCTION BUDGET APPROVED BY COLORADO INTERSTATE

A construction budget of more than $35,000,000 has been approved by the board of directors of Colorado Interstate Gas Co. for 1955.

Highlighting the proposed construction during the year is the 365-mile natural gas pipe line from Rock Springs, Wyoming, to Denver. However, construction of this line is contingent upon start of construction of the line from the San Juan Basin to the Northwest. The 22" line and allied facilities are estimated to cost approximately $24,600,000, and will have an initial transmission capacity of 100 MMcf daily for the Denver market area.

TEXACO LPG DIVISION

The Texas Company announced their establishment of a Liquefied Petroleum Gas Division to handle sales of propane and butane gas in the territory east of the Rocky Mountains. Milton C. Lewis has been appointed manager of the division, with headquarters in Tulsa, Oklahoma.

AWARD TO EUGENE NEWMAN

Eugene H. Newman, engineer for the Southern Union Gas Company, headquarters in Dallas, Texas, has been awarded a diamond-studded lapel pin in recognition of 25 continuous years' service.

Newman began his career with Southern Union as a draftsman and surveyor in 1930, soon after the company was founded.

BLAW-KNOX ANNOUNCES SIX SALES APPOINTMENTS

James P. Beyser, vice president and general manager of Buflovak Equipment division, Blaw-Knox Company, Pittsburgh manufacturer of process equipment for industry, announces six new sales appointments.

Harold V. Williams, formerly sales manager of Blaw-Knox process equipment, has been promoted to assistant sales manager of Buflovak Equipment division, with headquarters at Buffalo.

Robert H. Hazlett, formerly assistant manager of the Process Equipment department, has been made gas equipment sales manager at Buflovak.

In connection with the expansion at Buflovak, E. V. Hegg, vice president and sales manager, announced four district office appointments.

Edgar L. Demarest, formerly representing the Buflovak division at the company's New York office, has been appointed district sales manager at Philadelphia, a new sales office.

Warren V. Eisenhuth has been added to the sales organization and is assigned to the Philadelphia office, where he will assist Demarest. Eisenhuth formerly was a sales representative in the Process Equipment department.

Harold R. Kibby has been promoted to sales representative at Birmingham, Alabama, another new sales office for the division.

George B. Philips has been appointed sales representative at the firm's Chicago office. He formerly was a sales engineer of the Process Equipment department.

GROVE LAWRENCE NAMED TO AGA OPERATING SECTION POST

Grove Lawrence, vice-president, Southern California Gas Company, Los Angeles, has been selected to serve as second vice-chairman of the Operating Section of the American Gas Association for the remainder of the Association year. He succeeds Frederick A. Hough, Bechtel Corporation, San Francisco, who resigned in December because of a change in company affiliation.

Lawrence was graduated in 1921 from the California School of Mechanical Arts and received an AB degree in 1925 from Mechanical Engineering School, Stanford University. He entered utility service with the Midway Gas Company in August, 1925, as a field engineer. This company was later acquired by Southern California Gas Co.

He is an active member of the Pacific Coast Gas Association, a member of the executive committee of California Natural Gas Association, and a member of American Petroleum Institute.

He has been active in AGA affairs, serving for several years on the Technical Research Committee; the Committee on Underground Storage, and the Operating Section Management Committee.

Lawrence played an important part in integrating activities of the former Natural Gas Department of AGA into those of the Operating Section when separate departments of AGA were discontinued. In 1954 he was co-chairman of the section's first Gas Supply, Transmission and Storage Conference.

NEW ORLEANS PLANS BIG WELCOME FOR SGA MEMBERS

New Orleans, the home town of hospitality, will put on its best spring dress May 16, 17, and 18 to welcome the Southern Gas Association's 47th annual convention.

Approximately 2000 delegates and visitors are expected to register for the three-day meeting.

There will be addresses by nationally known men (and a lady, too!) in business and economics, reports on various phases of the natural gas industry by experts from many sections, and a peek at the future through some highly reliable crystal balls.

The big entertainment feature will be presented in true New Orleans style. If not quite out of this world, it at least will give everybody that delightful feeling of floating.

A unique feature for the ladies will be luncheon on Tuesday, May 17, at Diamond Jim's La Louisiane Restaurant. Mrs. J. H. Collins, Sr., wife of the SGA's first vice president, is chairman of entertainment for the ladies.

Thad W. Rowden, Jr. of Arkansas Western Gas Company, Fayetteville, Arkansas, is this year's general convention chairman. Vice-chairmen are L. A. Bickel of Lone Star Gas Company, Dallas, for the companies, and Ernest G. Hotze of Clark Bros. Co. division of Dresser Industries, for the manufacturers.

C. B. Wilson of New Orleans Public Service Inc., housing chairman, urged that hotel reservation requests be made right away, not to him, but to the SGA Housing Committee, 1932 Life of America Building, Dallas 2, Texas.

LUXON VICE-PRESIDENT OF AMERICAN LIQUID GAS

Appointment of Lester L. Luxon as vice-president of the Unit Construction division, has been announced by American Liquid Gas Corporation.

Luxon, who was formerly manager of the Gas Plant division, has been associated with the company for a considerable time. He is directly responsible for many large LP-Gas standby plant installations that the company has constructed for leading industrial firms throughout the West.

JIM FARLEY JOINS MASTER TANK AND WELDING CO.

F. E. "Jim" Farley has joined the sales staff of Master Tank & Welding Company, Dallas, Texas, according to announcement by Sam O. Weempe, co-owner. Farley will head the sales of the newly organized Motor Fuel Tank Division. Master Tank & Welding will have a complete line of fuel tanks for transport trucks, including round, semi-oval, and step tanks in 35, 45, 55 and 65 gallon capacities.

NAMED SALES REPRESENTATIVES

Fielden Instrument division of Robertshaw-Fulton Controls Company has appointed H. J. Klug Company sales representatives for Nebraska and Western Iowa, it was announced by Ralph M. Stotsenburg, division sales manager.

The division is a producer of industrial instrumentation and electronic control devices, and is one of seven manufacturing divisions of Robertshaw-Fulton.

J. G. MONTGOMERY, JR., HEADS UNITED NATURAL GAS CO.

J. G. Montgomery, Jr., has been elected president, United Natural Gas Co., The Mars Company, and The Sylvania Corporation. He succeeds H. S. Rose who retired as president following 52 years' service with the companies.

Montgomery has had 30 years' service with UNG and its associated companies. Prior to joining UNG, he was an instructor of physics at West Virginia University. Later he was employed about 4 years by Empire Gas & Fuel Company, Bartlesville, Oklahoma, and by Hope Natural Gas Company, Pittsburgh, for one year.

Montgomery entered UNG's employ as chief geologist on June 8, 1925. In 1928, he was appointed superintendent of production and transmission, retaining the position of chief geologist. He was elected a director of UNG and vice president of The Sylvania Corporation in January 1933. In 1939, he was elected a vice president of UNG and a director and vice president of The Mars Company.

On October 1, 1953, Montgomery was elevated to the office of executive vice president of UNG, Mars and Sylvania and on December 15, 1954, he was elected a director of National Fuel Gas Company, New York City, parent of the three companies.

BALTIMORE CO. PROPOSES NAME CHANGE

A proposal to shorten the name of Consolidated Gas Electric Light and Power Company of Baltimore to Baltimore Gas and Electric Co. will be submitted to the company's stockholders for approval at the annual meeting to be held April 1, Charles P. Crane, president, has announced.

MEN at Work

James M. Hawk, Spaulding Drive, Bath, New York, has been appointed superintendent of the lease department, Northern area, *New York State Natural Gas Corporation.*

Roy C. Patterson, has been appointed superintendent of a newly-created Northern division of *New York State Natural Gas Corporation.*

Elwood C. Petsinger, has been appointed superintendent of the Lease Department, Southern area, for *New York State Natural Gas Corporation.*

John C. Ferguson, Jr., Pittsburgh, Pennsylvania, has been appointed head of the land department of *New York State Natural Gas Corporation.*

Alex T. Johnson, Jr., Jackson, sales manager in United Gas Company's Mississippi distribution division for seven years, has been named Louisiana-Mississippi sales manager.

I. E. Rowe, Jackson, who was utilization engineer for the Mississippi division for six years, was appointed director of utilization for the two-state area.

Miss Emagene Burge, home service advisor in Jackson from 1950 through 1953 and in Gulfport in 1954, has been appointed Louisiana-Mississippi home service director.

GUARANTY SURVEY EDITORIAL OPPOSES GAS REGULATION

A question of prime importance with which Congress will be called upon to deal at this session is the economic status of one of the country's major industries—the production of natural gas, *The Guaranty Survey* declared in its March issue.

The Guaranty Survey is the monthly publication of the Guaranty Trust Company of New York.

"Shall the competitive and hazardous business of natural gas production be regulated as a public utility, or shall it be allowed to operate under the rules of private competitive enterprise? The continued vitality and growth of this dynamic industry, and of others as well, may hinge upon the answer," according to the feature editorial, "A New Field of Federal Regulation."

"The question arose suddenly last June as the result of a Supreme Court decision. By a vote of five to three, the court ruled that the Natural Gas Act of 1938, which gives the Federal Power Commission authority to regulate sales of gas for resale in interstate commerce, applies to sales by independent producers to interstate pipeline companies. Section 1(b) of the Act reads: 'The provision of this Act . . . shall not apply . . . to the production or gathering of natural gas.' For sixteen years it had been generally supposed, and the Commission itself had repeatedly ruled, that this exemption covered sales by independent producers and gatherers—that is, producers and gatherers not affiliated with the interstate pipeline companies. The Court's decision, which reversed one of the Commission's rulings, upset this established belief and the practices based upon it.

"The strength of the opposition to Federal regulation of natural-gas production is based upon the belief that it is not only unnecessary but positively detrimental. Gas men are convinced that their industry cannot thrive in a public-utility environment. The cost of drilling dry holes cannot be capitalized and hence cannot be made the basis for rate regulation by conventional methods. Exceptional risks can be taken only when there is a reasonable prospect of corresponding rewards to the successful. Unless these risks are taken, new natural gas reserves in sufficient amounts cannot be found.

"The immediate loss and injustice to natural-gas producers are serious enough, but the questions involved in Federal regulation strike even deeper," concluded *The Guaranty Survey*. "An increasingly vital industry is threatened with creeping paralysis. A precious natural resource is exposed to the risk of artificially induced wastage. Consumers face the prospect of effects on price and supply exactly the opposite of those intended. Worst of all, the whole concept of free competitive markets is under attack. If natural gas production is subject to Federal regulation, no segment of industry entering into interstate commerce is logically exempt. What Congress is being asked to do is not merely to rescue an important industry and its customers from the risk of grave injury, but to reaffirm a basic principle of American politico-economic philosophy."

"Best machine yet" says district manager of company using Clevelands for 29 years

OKLAHOMA NATURAL GAS CO. bought its first Cleveland "Baby Digger" back in 1926 and since then has continually used Cleveland trenchers throughout its system. The Company is currently keeping 10 Clevelands busy on distribution work.

Typical of the hundreds of jobs Clevelands have done for this owner is the one pictured above in Bristow, Okla. This job called for 800 feet of trench, 30 inches deep by 14 inches wide, for the rebuilding of a main under an asphalt-surfaced street and through shale, in the middle of winter. The "Baby Digger" easily cut the required trench—right on schedule—in spite of the combination of adverse conditions.

Commenting on the Cleveland's performance, O. M. Heartwill, manager at Bristow for Oklahoma Natural Gas Co., put it tersely, "Best machine yet."

Performance like this is *not* extraordinary for Clevelands—it's *expected* of them. Their quality construction, maneuverability, compactness, dependability and all around dig-ability have made them standard equipment for the gas industry for more than 30 years. It's a record worthy of your consideration.

See your local distributor for the full Cleveland story or write direct to:

THE CLEVELAND TRENCHER COMPANY • 20100 St. Clair Ave., Cleveland 17, Ohio

CLEVELAND

ELECTRONICS SOLVE GAS DISTRIBUTION PROBLEMS

How to deliver gas efficiently may be determined by an electronic "brain," according to electrical engineers at Armour Research Foundation of Illinois Institute of Technology, Chicago.

The Foundation's Computer Center currently is using analog and digital computers to solve problems in providing gas systems of adequate capacity in cities serviced by the Northern Illinois Gas Company, in its 17-county area in northern Illinois.

Analog computers perform calculations from electrical circuits that simulate the various pipe sections, gas flows, and pressure drops, producing answers at a savings in time, according to David Rubinfien, supervisor of the center.

But digital computers, he explained, work even better for gas distribution problems because its solutions are more straightforward.

With the digital computer problems are reduced to numbers and formulas that express process operations. The equations, punched into cards, are fed into the "brain" for reading and retention in its memory circuits.

Data, such as demand for gas and pipe sizes and lengths, are supplied. The computer then relates this knowledge with its basic information, disgorging the required operating solutions.

The electronic method not only is more accurate than the older hand method, but also is much faster. Computers, which can add as many as 500 ten-digit numbers in one second, have rendered desk calculation obsolete, Rubinfien said.

The gas company turned to electronic computing because of a boost in demand for gas which has increased five times since 1930 and two and a half times since the end of World War II.

Since the peak demand for gas occurs during winter months, Rubinfien explained, the gas company must estimate in advance the maximum gas each network will be called upon to supply, and decide whether the network can deliver it as a satisfactory pressure.

Each network then is solved to determine the distribution of flows and pressure drops under the assumed loads. If the pressure drops are excessive, the engineers must design improvements in the network and check the results of these improvements by solving the network again.

"This must be done for each network every time a system study is made—a laborious job that is handled best by electronic computers," Rubinfien said.

The purpose of the initial project was to evaluate current methods of solving this over-all planning problem and to study Arternate methods. Now, however, the Armour Research Foundation Computer Center solves gas distribution problems on a regular service basis, he added.

HONEYWELL OPENS BRANCH

Establishment of a new branch sales and engineering service office in Hammond, Indiana, has been announced by Minneapolis-Honeywell Regulator Co. O. V. Spousta, formerly manager in Louisville, Kentucky, will manage the new office.

HAINES ELECTED ASHAE PRESIDENT

More than 2500 members of the American Society of Heating and Airconditioning Engineers attended the 61st annual meeting in Philadelphia at which time John E. Haines succeeded L. N. Hunter as president of the Society.

Other officers installed with John E. Haines, who is vice president of Minneapolis-Honeywell Regulator Company, Minneapolis, Minnesota, are: First vice president, John W. James, vice president McDonnell & Miller, Inc., Chicago; second vice president, Peter B. Gordon, vice president of Wolff & Munier, Inc., New York; treasurer, Elmer R. Queer, director and professor of engineering research, Pennsylvania State University.

ACIPCO PROMOTES 5 KEY EXECS

The American Cast Iron Pipe Company, of Birmingham, Alabama, has announced the promotions of five key officials.

Stephen D. Moxley, former executive vice president, has been named president to succeed Charles Otto Hodges who retires after 38 years' continuous service.

Moxley is a former national vice president of ASME.

Others who assumed top posts at Acipco were Frank H. Coupland, who becomes vice president and works manager; Arnold J. Herrmann, who was named vice president and sales manager; Kenneth R. Daniel, vice president and chief engineer, and A. E. Bowen, treasurer.

Reynolds OFFERS A NEW PERFECTED SAFETY CONTROL FOR ALL SERVICE REGULATORS

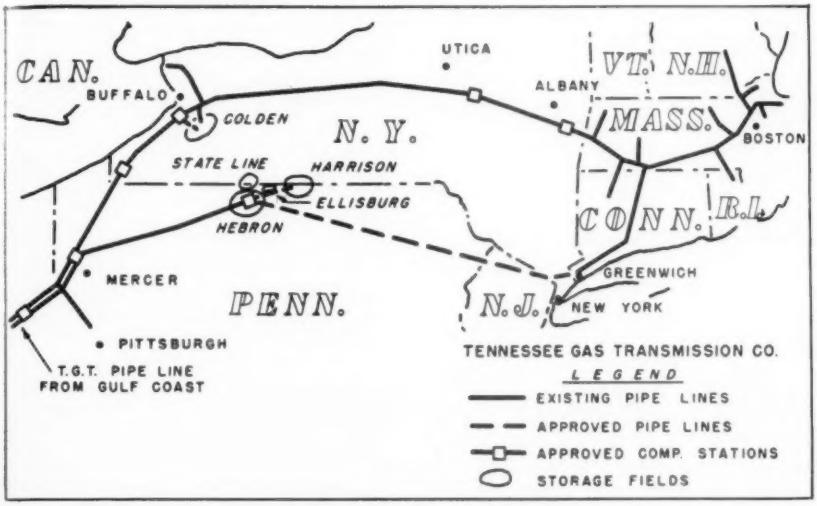
Reynolds' new Safety Control may be attached to any Reynolds spring type service regulator built in the last fifteen years.

GAS CONTROL SINCE 1892

- **Prevent regulator from falling in a wide open position, thus limiting the amount of gas the safety seal has to pass.**
- **Enable the gas company to set the regulator for a certain demand and if a customer increases that, his outlet pressure would drop which would cause him to call the company and they can find out what his real demands are.**

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA

CONSTRUCTION BEGINS IN MAY ON 248-MILE TGT LINE



A 1000-mile Tennessee Gas pipe line loop, shown on the map above, will result this year when the company builds the 243-mile pipeline shown by the dotted line. A new alternate natural gas supply source will be provided for the New York City-Northern New Jersey area as well as New England.

Construction will begin about May 1 on a 248-mile extension of the Tennessee Gas Transmission Company's pipe line system from North Central Pennsylvania to the outskirts of New York City to serve principally the New York City-Northern New Jersey metropolitan area has been announced.

Before winter this new line will provide this heavily-populated area with its newest and third source of supply of natural gas from the Gulf Southwest. The Tennessee Gas system, the nation's longest, now stretches 2200 miles from South Texas to northern New England.

The project to serve the New York City area entails the construction of 248 miles of 24" pipe from the present terminus of a company pipe line at the firm's Hebron storage field in Pennsylvania eastward across that state, New Jersey and New York to near Greenwich, Connecticut. There it will connect with the south end of the company's New England pipe line system.

On completion of the Hebron-Greenwich pipe line this fall, deliveries totaling 75,000 Mcf per day will begin to four companies in the New York City-Northern New Jersey metropolitan area, as follows: Consolidated Edison Co. of New York, Inc., 25 MMcf per day; Public Service Electric & Gas Co. of Newark, 25 MMcf; Brooklyn Union Gas Co., 20 MMcf; and Long Island Lighting Co., 5 MMcf.

TRANSCON FILES $2,176,000 RAISE

Transcontinental Gas Pipe Line Corp. has filed a proposed $2,176,000 annual wholesale natural gas rate increase with the Commission. The proposed rates would be over and above a $4,000,000 annual increase now under FPC suspension. Transcontinental proposes to make the $2,176,000 increase effective March 1. The new increase is based on the increased cost of gas purchased from five suppliers.

Transcontinental's earlier proposed increase was suspended by FPC by order issued November 26. The company originally filed for a $3,204,000 increase in this proceeding, but subsequently raised this by $796,000.

FALVEY

Continued from page 23

quisitions effected with an eye to placing the individual segments of business in a much better position to ride out successfully any unsettlement in the economy that might take place.

In fact, so good is the husbandry of management becoming that widening profits in a number of instances are being recorded in the face of price concessions and a greater amount of free service offered buyers where necessary to maintain sales volumes.

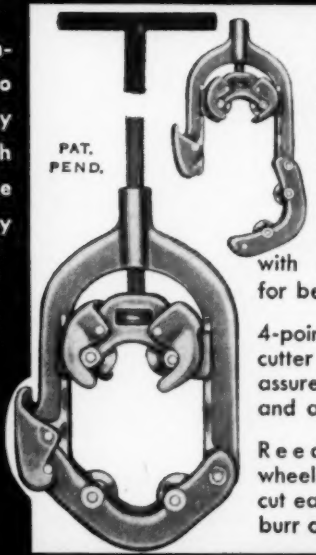
Favors equity financing

Recognizing the quality of present corporate earnings, Adrian M. Massie, chairman of New York Trust Company, and a veteran authority on corporate finance, recently came out strongly in favor of equity financing. With the stock market on its present high plane, and with market price to earnings, book values, and other ratios all favorable, he said that the present is second to none for common stock financing.

While continuing to adhere to the time-honored debt to equity ratios for corporate financing and capitalizations, he decried the too-great dependence of some corporate managements on debt as a means of financing expansion as he pointed to the recent General Motors Corporation tremendous common stock offering as a wholesome development and one that should help to set a pattern of greater corporate resort to the equity market as a source of new funds.

IF YOU CUT LARGE DIAMETER PIPE...
YOU NEED THESE
New REED HINGED 4-WHEEL PIPE CUTTERS
Four sizes cover the range from 2½" to 12"

Users tell us these completely new cutters are so efficient they often "pay for themselves" through the savings in crew time on a half-dozen cuts. They are the first really practical tools for cutting off steel or cast iron pipe in sizes from 2½" to 12". You can, for example, cut 8" steel pipe completely off in less than five minutes.



Four wheel design requires minimum swing of handle—less digging in ditch work, easier "tight-corner" cuts.

Closed frame permits light weight with complete rigidity for better cutting.

4-point guide aligns the cutter on the pipe . . . assures perfect tracking and a right angle cut.

Reed Razor Blade wheels track perfectly, cut easily and roll down burr on steel pipe.

Unconditionally guaranteed to be the most efficient cutter you have ever used. Ask your jobber or write for literature.

REED MANUFACTURING COMPANY
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METER RETIREMENT

Continued from page 21

meter replacement problem, we are faced with the following facts:

Grand Total Cost per Meter per Year

	20 years service	30 years service
Purchase, repair and maintain	$1.141	$1.196
Lost revenue due to age and obsolescence	.072	0.124
Total average annual cost	$1.213	$1.320

A lot of old meters are getting out of our repair shops with more money invested in their repair than they're worth. Our job—find them and replace them.

The domestic meter has often been referred to as the cash register of the gas industry. Good management cannot afford to neglect this vital part of the business. Overage meters are prone to "robbing the till" at low-flow rates. The best theft insurance that can be purchased is the policy of periodic replacement of the old and often obsolete meters with new, modern, accurate, and "flow-sensitive" meters.

See Appendix, below

Appendix A

OVERHAUL COSTS FOR 100 DOMESTIC METERS

Class "B" repair

PART NAME	QUANTITY PER 100 METERS	COST
Top	15	$ 33.15
Top gasket	100	7.70
Top screws FH ½" x 12-24	310	3.44
Valve wrist sleeve	200	2.16
Tangent pin	300	1.08
Tangent wrist sleeve	100	1.10
Front or back gasket	10	0.66
Index 1 ft. 4 circle	15	17.85
Index box P.S. glazed	10	11.10
Axle stuffing box complete	10	2.40
Wriggle tail, assembly	15	1.32
Flagarm, long & short assembly	15	2.85
Crankshaft, arms, assembly, O.S.	15	12.00
Crank frame arm, bushed	15	15.00
Axle stuffing box washer	45	0.44
Tangent assembly	5	1.80
Hand hole disc gasket	30	0.60
Badges	14	0.42
Badge plates	14	0.98
Class of repair tag	100	5.00
Paint, gals.	2	8.50
Paint thinner, qts.	2	0.80
Total material cost		$130.35
Total labor		217.00
Total overhead		130.00
Grand total		477.35
Overhaul cost, per meter		4.77

OVERHAUL COSTS FOR 100 DOMESTIC METERS

Class "C" repair

(Same parts as Class "D" repair except for diaphragms)

Material Class "D" Repair	$791.63
Less	594.00
Total material cost	$197.63
Total labor	408.00
Total overhead	244.80
Grand total	850.43
Overhaul cost, per meter	8.50

OVERHAUL COST FOR 100 DOMESTIC METERS

Class "D" Repair

PART NAME	QUANTITY PER 100 METERS	COST
Flag arms, long and short assembly	182	$ 34.58
Tangent assembly	8	2.88
Crank frame arm, brushed	11	1.10
Valve wrist sleeve	200	2.16
Tangent wrist sleeve	100	1.10
Tangent washer	100	.50
Crank shaft, arms, assembly	12	9.60
Wiggle tail assembly	79	6.95
Stuff box packing	150	.53
Axle stuff box washer	65	.64
Cotter pins	400	.32
Tangent pins	300	1.08
Flag rod bracket	10	.10
1 ft. 4 circle reg. index	27	32.13
Index box, glazed P.S.	15	16.65
Diaphragm disc box gasket	20	.13
Diaphragm clamp gasket	5	.06
Diaphragm disc guide	5	.06
Diaphragm front	100	297.00
Diaphragm rear	100	297.00
Sidescrew F.H. ⅜" x 12-24	210	2.21
Topscrew F.H. ½" x 12-24	257	2.85
Index box screw F.H. 1/32" x 12-24	35	.53
Sealing washer	100	.16
Screw 3/16" x 4-36 RH	20	.03
Drive shaft type #1 wriggler	91	6.01
Front and back gaskets	200	13.20
Top gasket	100	7.70
Flag rod bracket base	10	1.13
Top	15	33.15
Front P.S.	1	.43
Axle stuffing box, comp.	2	.58
Crank frame, click and axle assembly	2	1.78
Handhole disc gasket	30	.60
Repair badge	100	5.00
Badge plate	15	1.05
Badge	15	.45
Paint, gals.	2	8.50
Paint thinner, qts.	2	.80
Diaphragm oil, gals.	½	.90
Total material cost		$ 791.63
Total labor		408.00
Total overhead		244.80
Grand total		1,444.43
Overhaul cost, per meter		14.44

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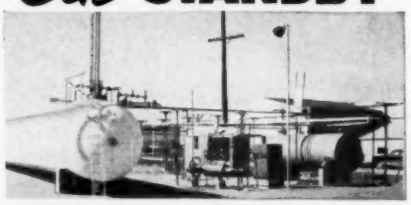

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A Packaged Draketown Propane Plant will help you reduce demand charges; provide a supply of gas during curtailment periods... at the turn of a valve... or supply that outlying section or plant 100% if desired.

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NEW Bulletins

LE ROI AIRMASTER

This bulletin illustrates and describes many features found on the company's 85 cfm heavy duty compressor. A cross section view of the one unit engine-compressor design, shows how the single cooling system, one lubrication system, and one crankcase and crankshaft simplify any maintenance. Magneto ignition, replaceable wet type cylinder sleeves, tight sealing sides for tool and hose storage, and water cooled manifold are other design points which are presented in the bulletin. Specifications are given for the compressor and engine. Tool capacities are included as well as weights and dimensions for skid and wheel mounted units.

Pp. 4. Le Roi Div., Westinghouse Air Brake Co., 1706 South 68 St., Milwaukee 14, Wis.

TRIANGLE—THE GUARANTEED PLASTIC PIPE

A detailed description of the manufacturer's complete line of rigid, semi-rigid and flexible plastic pipe is presented in this bulletin. It covers sizes, fittings and joining.

Pp. 4. Triangle Conduit & Cable Co., Inc., New Brunswick, N. J.

PROPERTIES OF SUPER REFRACTORIES

The latest physical and chemical properties on the manufacturer's super refractories are presented in this new bulletin. It presents descriptive information on refractories that conduct heat very rapidly and on others that are good for thermal insulating purposes. Silicon carbide, mullite, fused aluminum oxide and fuse cast alumina refractories are discussed. Lists of applications are presented, together with pertinent charts and tables.

Pp. 22. The Carborundum Co., Refractories Div., Perth Amboy, N. J.

NIAGARA AERO HEAT EXCHANGER

Controlled temperature cooling of water, oil and other liquids and gases in a wide variety of industries is described in this new bulletin about the company's heat exchangers. The bulletin reports that effective, controlled cooling is attained with the unit and that it gives a constant balance of heat removal with heat input load. For use in chemical processes, metal working and machine work applications.

Bulletin 124. Niagara Blower Co., 405 Lexington Ave., New York 17.

MAGNUMATIC TRANSMITTERS

This new bulletin describes a magnetically actuated pneumatic transmitter designed for use with all types of pneumatic receivers and control instruments. The transmitter employs a force-balance pneumatic system requiring a minimum of mechanical motion, resulting in low inertia characteristics and improved response time, according to the bulletin. Only three moving parts are incorporated; two stainless steel pistons, which move on an air cushion within cylinders of precision-bore glass, and the armature. All mechanical linkage and friction points are eliminated. The transmitter provides fast, full range linear response in 3 to 15 psi output air pressures for all standard receivers. Reduction of air capacity required to operate the pneumatic circuit accounts for greater speed of dynamic response.

ECLIPSE LOCK-TITE SAFETY SHUT-OFF VALVES

New features incorporated into the manufacturer's safety shut-off valves are fully described in this new bulletin. They include: grant of UL approval in addition to previous FM approval; increased range of sizes, now from 1" to 6" inclusive; and new AE electrical power control unit which gives large increase in effective pressure to piston. In addition, the bulletin contains operating and construction details, cites application examples, and gives dimension tables.

Bulletin M-302. Pp. 4. Eclipse Fuel Engineering Co., 1002 Buchanan St., Rockford, Ill.

LEFAX 1955 TECHNICAL DATA CATALOG

A newly revised catalog of pocket size technical data books has been announced by the company for engineers, technical

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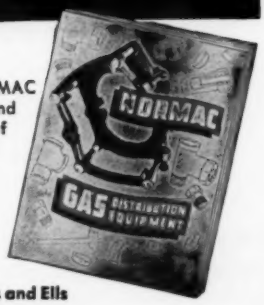

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Cocks • Ball Joint Clamps • Service Tees and Ells

workers, teachers and students. In all, over 2000 subjects are listed, including much newly revised material and technical developments covering every phase of engineering. Subjects covered include: architecture, home heating, air conditioning, building construction, piping data, surveying tables, highway engineering, math tables, physics, trig-log tables, general chemistry, chemical tables, analytic chemistry, machinist's data, power transmission machinery, thermodynamic tables & charts, physical & thermodynamic data, metals, metallurgy, ac motors & generators, transformers & relays & meters, and many others.

Lefax Catalog. Lefax Publishers, Philadelphia, Pa.

LEEDS & NORTHRUP SPEEDOMAX TYPE H INSTRUMENTS

Complete information about the manufacturer's new Speedomax type H indicators, recorders and controllers is now available in a series of five data sheets. These data sheets describe how these new instruments can be used to indicate or record temperature, or to provide two-position or one of three types of proportioning control: proportional action, position-adjusting type or duration-adjusting type—the last two types providing, in addition to proportional action, automatic reset and rate actions.

Included in these sheets are photographs and line drawings illustrating the design features and the small, compact size of the new line. To facilitate control selection, these sheets list various process conditions for which each type of control is usually recommended, and in addition, provide an illustrated, tabular arrangement of complete control systems. Specifications and standard ranges for all models are conveniently tabulated. "How to Order" instructions complete the sheets.

Bulletin ND46-33100 to ND46-33104. Leeds & Northrup Company, 4934 Stenton Ave., Philadelphia 44, Pa.

KEMP CASE HISTORIES

This bulletin, which features installations of the manufacturer's industrial gas equipment at 17 major companies, is a detailed report illustrating with on-the-spot photographs how companies in many fields use the company's immersion heaters, dynamic dryers, and inert gas generators.

Bulletin G-10. Pp. 20. C. M. Kemp Mfg. Co., 405 E. Oliver St., Baltimore 2, Md.

SELECTIVE TELEMETERING APPLICATIONS

A method that provides information about flow and other values required for effective remote operation is described in detail in this technical bulletin recently issued. It tells how a compromise often can be made to provide some information continuously while other data can be selected when needed by the operator. The shared use of telemeter communication channels with supervisory control systems that permit actual remote control is noted as reducing original cost of equipment, cutting space requirements and permitting shared use of telemetering instrumentation and sensing devices.

Bulletin ATIC-929-RS. Pp. 12. Motorola Communications & Electronics, Inc., Tech. Inf., 4501 W. Augusta Blvd., Chicago 51.

THE FRACTON—ANALYSIS OF LIGHT HYDROCARBON GASES

This booklet describes a new instrument for the analysis of light hydrocarbon gases. The advanced method of adsorption fractionation is fully explained. Drawings, including detailed flow diagram, and photographs illustrate the text. High speed of analysis is featured. Almost completely automatic, the method offers users accuracy and reproducibility with analytical procedures easy to standardize. Typical applications include natural gas, gasoline plant gases and liquids, refinery gases, cycling

COMPUTER

Continued from page 16

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Quick easy way

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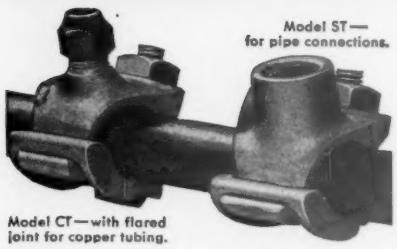

Model ST—for pipe connections.

Model CT—with flared joint for copper tubing.

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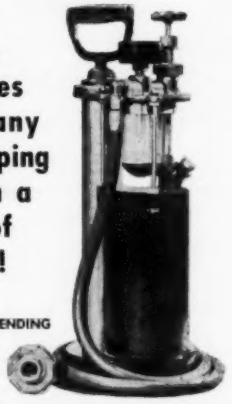
M. B. SKINNER CO.
SOUTH BEND, 21, IND., U. S. A.

DRAGNET
leak detector

detects and locates leaks on any pressure piping system in a matter of minutes!

PATENTS PENDING



Here's the newest time-saver in the industry! The compact, portable Dragnet Leak Detector will detect even the tiniest leak on any pressure piping system for gas, steam, water or refrigeration. Unique "bubble action" principle much faster than by using pressure gauge or manometer.

SEND FOR BULLETIN 545

UNIVERSAL
CONTROLS CORPORATION
731 WEST DAVIS STREET DALLAS 8, TEXAS

plant gases, liquefied petroleum gases, synthetic rubber intermediates, petro-chemical gases and other light hydrocarbons.

A pocket inside the back cover contains several data sheets with examples of actual analyses for specified samples. As new methods are developed, additional data sheets will be mailed to recipients of the booklet.

Booklet 82. Pp. 12. Burrell Corp., 2223 Fifth Ave., Pittsburgh 19.

WORTHINGTON DH ENGINE

Information on construction details, applications and latest design features of the company's diesel engines is presented in this bulletin. In addition, it contains a three-page schematic diagram illustrating the various component parts and specifications. Fuel costs per gallon are shown on separate charts for oil, natural gas and propane along with a horsepower ratings chart for 5, 6 and 8 cylinder engines.

Bulletin No. S-500-B42B. Pp. 10. Worthington Corp., Harrison, N. J.

ATLAS REGULATING DEVICES

This bulletin has illustrations and information on 12 basic control valve types frequently used by the marine and chemical process industries, power generating facilities, and for numerous liquid or gas pressure control applications requiring precise instrumentation by means of automatic regulators.

Bulletin #2. Pp. 4. Atlas Valve Co., 280-284 South St., Newark 5, N. J.

INDICATING TEMPERATURE CONTROL

Six-page brochure describing and illustrating newly developed instrument designed to control and indicate temperatures of gases, liquids or hot plates over wide ranges. The brochure gives typical applications, outstanding features, and all engineering data required by designers.

Bulletin 42. United Electric Controls Company, 85 School Street, Watertown, Mass.

AUTOMATIC CONTROLS

A new 32-page catalog describing the complete line of White-Rodgers automatic controls for heating, refrigeration, and air conditioning has been released. The catalog contains complete information regarding room thermostats, space thermostats, relays, pressure, and hydraulic-action temperature controls.

Included also are all controls for oil and gas-fired systems of both warm air and hot water heating. Featured are the new unusually quiet "Cushioned Power" solenoid gas valves and improved automatic pilots.

Controls for special applications are also shown, such as explosion-proof thermostats, ice-bank controls, indoor-outdoor controls, and many others.

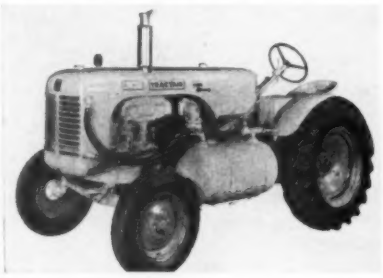
White-Rodgers Electric Company, St. Louis, Missouri.

A. L. HAWLEY, JR., sales manager, Metalbestos division, William Wallace Co., has been appointed to the National Council for LP-Gas Promotion. He was named by Liquefied Petroleum Gas Association.

NEW Gas Industry Equipment

Tractor—Le Roi

To provide greater versatility, the air output of the Le Roi Tractair has been increased from 105 to 125 cfm. The new and



more powerful Tractair has been introduced at the same list price as the previous model. The Tractair is a combination 125-cfm air compressor and a 35-hp wheeled tractor designed primarily to bring compressed air power to otherwise hard-to-get-at places. The governed speed is 1,350 rpm.

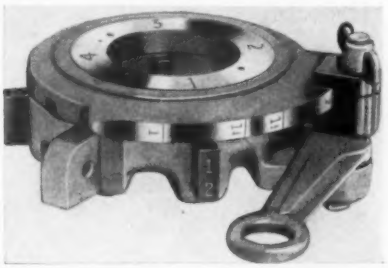
An Econotrol has also been added as standard equipment, which will vary the engine speed to match air demand. The Econotrol has a "start-run" lever allowing the operator to warm up a cold engine at idle and switch to "run" after the engine is warmed.

The power plant used is the Le Roi D226 engine combined in a single block with a well balanced two-cylinder compressor.

Le Roi Division, Westinghouse Air Brake Company, Milwaukee, Wisconsin.

Die Head—Beaver Pipe

The manufacturer has introduced a new improved quadra-type die head with die segments 1⅛″ wide to insure standard



length thread. One set of dies threads all four sizes, 1″ to 2″. Reportedly, the new die head, when set in position, will hold a thread graduation easily, accurately and will not slip. It is fully adjustable to cut standard, and over or under standard threads. Unit has a quick opening throw-out.

Beaver Pipe Tools, Inc., Dana Ave., Warren, O.

Solder—Anchor Metal

A mixture of fine powdered solder in the right proportions with an active flux, this product is a creamy paste which reportedly spreads on easily to any area to be bonded. Pre-mixed, it requires only heat. The cleaning action and wetting ability of the highly active flux prepares the entire metal surface for fusion, which is said to result in a strong, permanent bond. It is said to tin and sweat in one easy operation. The product is packaged in plastic, unbreakable squeeze bottles. Available in 3 oz. and regular ½ lb. and 1 lb. size bottles.

Redi-Mix Solder. Anchor Metal Company, 244 Boerum St., Brooklyn 6, N. Y.

Arc Welder—Lincoln

This new combination arc welder provides a choice of either AC or DC welding current. It is said to provide an ideal type

of welding arc for every type of manual welding application, permitting either a soft or forceful arc. The machine is available in several combinations. It can be obtained as an AC welder without DC current. To this unit a DC package can be attached whenever desired.

It is also available as a combination AC and DC machine with selection of either current made through a twist of a handle. Different output capacities of current can be combined to fit the machine to job requirements. Current models available are 300, 400 and 500 amp., AC combined with DC capacities in 200, 300, 375 and 450 amp.

Idealarc. The Lincoln Electric Co., Cleveland 17, O.

Portable Oxygen Unit—Cycle-Flo

This new light-weight, compact, oxygen unit can be used with no special training for resuscitation by anyone trained to give normal manual respiration. A complete unit, it is supplied in 2 light-weight, stand-

ard medical oxygen cylinders, a flow regulator with gauge that gives a range of 3 to 7 liter flow of oxygen per minute, and 2 disposable masks. The unit includes a carrying case.

Pocketaire. Cycle-Flo Company, 986 Bridgeport Ave., Milford, Conn.

Chart Paper—Foxboro

A new type chart paper with special properties said to improve the legibility of instrument records, these circular and strip charts are printed under controlled humidity conditions on a white sulphite sheet. Special sizing agents have been added to permit sharp, distinct recording without feathering. Scale markings and time arcs are printed in a neutral gray for vivid contrast with colored recording inks. Circular charts are printed and center punched, holding eccentricity tolerance of less than .002" between hub hole and scale circles.

The Foxboro Company, Foxboro, Mass.

Low Hydrogen Electrode—G.E.

A new low hydrogen electrode with powdered metal added to the coating, this unit provides fast, easy operation with excellent x-ray properties of weldments, according to the company. In a controlled test, a deposition rate of 61% faster than conventional electrodes was realized. A rate of 6.58 lbs. per hour was obtained with 3/16 in. Powdered metal in the coating is said to contribute to the weld, making possible higher speeds and in helping to stabilize operation of the electrode. Spatter is low and slag removal reportedly easy. Useful on alloy and mild steels.

Strikeasy-LH-1. General Electric, Schenectady 5, N. Y.

A-C Welder—General Electric

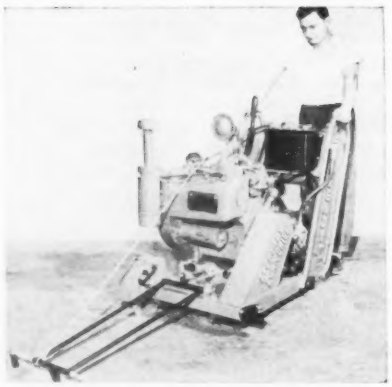
Covering a current range of 25 to 295 amperes, this new general purpose welder was designed for maintenance work, tack welding at high currents and steady welding at moderate currents, according to the company. It provides a 50% duty cycle in the normal welding range of 200 amp., with somewhat lower duty cycles when higher settings are used. A low range open circuit voltage of 75 volts is said to provide easy starting and to facilitate use of low hydrogen and stainless steel electrodes. Utilizes the moving primary coil design. Side covers of the new welder may be removed. The unit includes a dual position range switch, fingertip current adjustment and bolt-type output terminals.

General Electric, Schenectady 5, N. Y.

Concrete Saw—Eveready

A new concrete saw designed for heavy-duty performance, this model is equipped with a 25 hp. four cylinder, air cooled gasoline engine which drives the saw under full load at speeds up to 12 fpm. Two abrasive coated wheels act as a smooth, positive friction drive to both rear wheels of the saw. This mechanism is said to eliminate slippage, jerking and twisting of the blade. The self-propelling unit is engaged or disengaged by foot pedals.

Features include: dual mounting of blade guard and blade; cutting on either side of



blade; maneuverability, one man can tilt saw back on rear wheels and move it into position.

Model E-25. Eveready BrikSaw Co., 1509 South Michigan Blvd. Chicago 5, Ill.

Reeled Plastic Pipe—Triangle Conduit

A new disposable, reel type package combination containing the manufacturer's coiled, flexible plastic pipe, has been introduced. Because of the new packaging the company claims the following advantages: longer lengths available; pipe can be pulled off reel easily and quickly; reels designed to stack compactly; and protection of mechanical damage during shipment.

Triangle Conduit & Cable Co., Inc., New Brunswick, N. J.

Welder—Hobart

This is a new electric motor driven d-c arc welder with an extremely wide welding range of 5 to 300-amp. It has a normal rat-

ing of 200-amp for average welding work and the added ability to get down to exceptionally low heats for best results in welding very light gage metals.

Model MBT-204 has a special resistance unit connected in the lowest range setting of the main selector switch, to make possible the low welding heat. This unit is mounted under a special hood on the back of the control cabinet, so as to dissipate its functional heat outside the welder. Satisfactory welding is possible with currents as low as 5-amps in a machine with a top welding range of 300-amps.

Hobart Brothers Co., Troy, Ohio.

Metal Primer—Rusticide

Not a paint, this metal primer when applied to rusted surfaces reportedly causes iron oxide—rust—to mechanically change to iron phosphate, an inert, hard, dark-grey substance. When dry, rust action is stopped and the subsequent paint coating attaches itself so tightly that moisture and oxygen cannot attack the metal, the company reports. Only loose rust need be removed before applying the primer with brush, spray or swab.

OSPHO. Rusticide Products Co., 3125 Perkins Ave., Cleveland 14, O.

Spray Coating—Koppers

A new spray coating for metal equipment, said to combine protection from corrosion with a moderate degree of insulation, this new product is made of processed coal tar pitch mineral filler, solvent, and granulated cork. Requiring no primer, one application produces a covering up to ½" in thickness. Such combined protection is best suited for oil storage tanks, asphalt storage tanks, any metal tank whose contents are kept at temperatures up to 150° F, chemical plants or equipment, and heating and ventilating ducts.

Bitumastic K. Koppers Company, Inc., Pittsburgh 19, Pa.

Electronic Metal Detector—Radiac

Reportedly the first electronic metal detector designed specifically for detecting small metal objects at appreciable depths, an advanced circuit supplies this unit with sufficient powers to penetrate a passage through earth, water, rock, ice, cement, adobe brick and asphalt. Weighing only 9 pounds, the unit has one knob tuning control and uses standard low voltage batteries. Methods of indication are a headphone and a meter, both of which respond when the exploring probe passes over a metallic object. Built to withstand intensive use, it consists of a radio-wave receiver and transmitter which can be unassembled when not in use.

Beachcomber. The Radiac Company, Inc., 489 Fifth Ave., New York 17.

Solenoid Valve—White-Rodgers

A new solenoid gas valve reportedly quiet in operation, this unit features a power element resiliently mounted to a synthetic rubber base enclosed in a soundproofed chamber, and a new type soft seat with compression spring closure. The seat, also of synthetic rubber, is bonded to an aluminum insert screwed into the valve body. A piece of the same material is used in the assembly attaching the aluminum closing disk to the plunger, thus cushioning the impact of the valve opening and closing. The new construction is said to eliminate practically all transmission and radiation of sound to pipe, mounting structure, or outer valve casing, as no direct contact is made between metal parts.

The valves operate from a current of .4 amp. May be used with all types of gas. Available in ½", ¾" and 1" sizes with capacities of 340, 450, and 775 cf/hr.

White-Rodgers Electric Co., 1209 Cass Ave., St. Louis 6, Mo.

CABINET COMMITTEE REPORT URGES NO FEDERAL CONTROL

The President's Advisory Committee on energy supplies and resources policy has issued its report in which it concludes that "we believe the Federal government should not control the production, gathering, processing or sale of natural gas prior to its entry into an interstate transmission line."

The report says that it is essential to give due consideration to the 3 operations of production, interstate transmission and distribution. Noting that individual companies may engage in more than one of these activities, the report asserted that "each operation of such companies should be treated by like criteria according to its appropriate industry function.

"In the production of natural gas it is important that sound conservation practices be continued. This area of conservation management is under the jurisdiction of State conservation commissions. In the interest of a sound fuels policy and the protection of the national defense and consumer interests by assuring such a continued exploration for and development of adequate reserves as to provide an adequate supply of natural gas, we believe the Federal Government should not control the production, gathering, processing or sale of natural gas prior to its entry into an interstate transmission line.

"The interstate transmission of natural gas by the interstate transmission lines and the subsequent sale of such gas for resale is a public utility function and should be under the regulation of the Federal Power Commission," the report continued.

"In considering the certification of new lines and applications for increased rates based on new or renegotiated purchase contracts, the Commission should consider, in order to provide protection for the consumer, not only the assurance of supply but also whether the contract prices of the natural gas which the applicant has contracted to buy are competitively arrived at and represent the reasonable market field price, giving due consideration, in the interest of competition, to the reasonableness and appropriateness of contract provisions as they relate to existing or future market field prices.

"The several states or their political subdivisions should continue to provide utility regulation of distributing companies in accordance with usual utility practices.

"Thus the complete cycle of natural gas production, transmission and utilization will be appropriately regulated: the production and conservation of natural gas by the state conservation commission; the interstate transmission of natural gas by the Federal Power Commission; and the distribution by the local public utility commissions."

The report also noted that "the basic principle regarding the regulation of natural gas and the use of alternative energy resources should be as far as possible that of free choice by the consumer and free and fair competition among suppliers. This, it is confidently thought, will provide most effectively for the assurance and flexibility of energy supplies, both for economic growth and strong security readiness. But sales either for resale or direct consumption below actual cost plus a fair proportion of fixed charges which drive out competing fuels constitute unfair competition and are inimical to a sound fuels policy.

"The committee recommends, therefore, that appropriate action be taken that will prohibit sales by interstate pipelines either for resale or for direct consumption, which drive out competing fuels because the charges are below actual cost plus a fair proportion of fixed charges."

LECTURERS ANNOUNCED FOR INDUSTRIAL GAS SCHOOL

The AGA industrial gas school, a 5-day intensive course, held every other year for the men who sell or promote gas for industrial processing operations, offers an opportunity for training in basic fundamentals and the newest techniques, applications and equipment for industrial heat processes.

Leading specialists on equipment and sales from the ranks of utility companies, gas equipment manufacturers and industrial organizations compose the carefully selected list of lecturers. Employees of industrial gas equipment manufacturers and dealers, plant engineers or others from present or prospective industrial customers, as well as all gas company men, are eligible for enrollment.

An outstanding faculty has been recruited for this 1955 school, each selected for his specialized knowledge of a particular subject:

J. Paul Jones, Consolidated Gas Electric Light and Power Company of Baltimore
C. B. Kiehle, Michigan Consolidated Gas Co.
E. S. Lanning, Jr., Public Service Electric and Gas Co., N. J.
C. H. Lekberg, Northern Indiana Public Service Co.
W. E. McWilliams, The Peoples Natural Gas Co.
Ralph L. Melaney, Equitable Gas Co.
Robert A. Modlin, The East Ohio Gas Co.
Stanton T. Olinger, The Cincinnati Gas and Electric Co.
Stewart C. Parker, The Peoples Gas Light and Coke Co.
J. V. Richards, New Jersey Natural Gas Co.
E. V. K. Schutt, Central Hudson Gas & Electric Corp.
H. R. Shailer, Jr., The Connecticut Light & Power Co.
W. S. Sims, Philadelphia Electric Co.
E. L. Spanagel, Rochester Gas & Electric Corp.
W. A. Stermer, The Manufacturers Light & Heat Co.
G. R. Walton, United Gas Pipe Line Co.
Carl Wierum, The Brooklyn Union Gas Co.

Manufacturers of equipment are giving their time and talent to the school. These lecturers will be:

Robert M. Buck, Bryant Industrial Products Corp.
Maurice J. Dewey, Dewey Gas Furnace Co.
Herman Gehnrich, Gehnrich & Gehnrich Inc.
Erwin E. Hirschberg, Eclipse Fuel Engineering Co.
C. G. Hobson, Hauck Manufacturing Co.
J. Huebler, Surface Combustion Corp.
H. R. Knoblauch, Minneapolis-Honeywell Regulator Co.
A. V. Leudemann, Mears-Kane-Ofeldt, Inc.
J. D. McCullough, The Babcock & Wilcox Co.
C. A. McFadden, Selas Corporation of America
J. J. McGowan, Equipment Engineering Co.
C. B. Mershon, Tate-Jones Div. Continental Equipment Co.
O. M. Olsen, Sellers Engineering Co.
R. J. Reed, The North American Manufacturing Co.
R. J. Ruff, Catalytic Combustion Corp.
F. C. Schaefer, American Gas Furnace Co.
H. M. Short, Aluminum Company of America
John E. Wakefield, Maxon Premix Burner Co.
A. W. Weber, Corning Glass Works

Herman Koester, Jr., of W. Wirt Young & Associates Inc., Wellesley Hills, Massachusetts, and A. D. Frydendall, will again address the students.

The registration for the 1955 school will be limited to 150 students and the deadline for registration is set for April 27.

NEW DEVELOPMENTS FOR NATURAL GAS CONFERENCE

New developments and advances made in natural gas production, transmission, processing and measurement will be discussed at the natural gas supply, transmission and storage conference sponsored by the operating section of American Gas Association, May 9 and 10, at William Penn Hotel, Pittsburgh. General sessions will be conducted both mornings, with luncheon sessions and round-table discussions in the afternoons. Five afternoon meetings are scheduled for Monday and four on Tuesday.

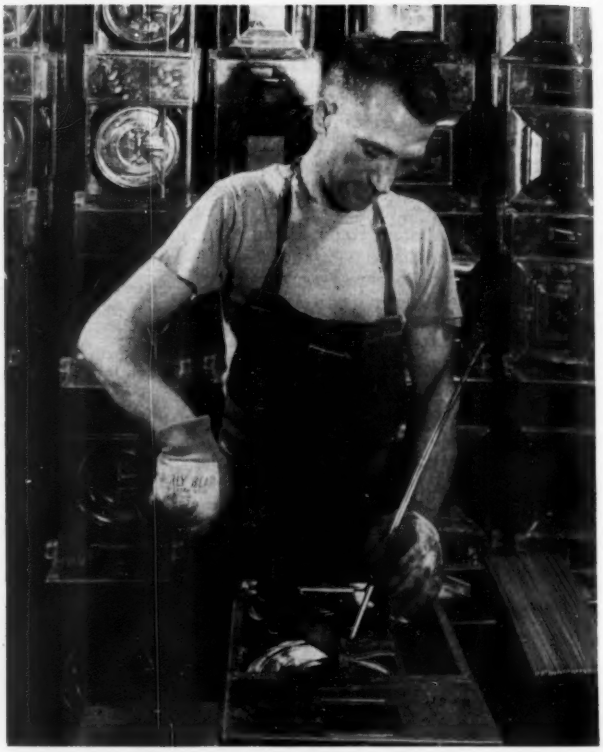
George W. McKinley, Hope Natural Gas Co., chairman, transmission committee, will preside at the general session, Monday. J. H. Collins, Sr., New Orleans Public Service Inc., vice-chairman, operating section, will report on the section's activities. Raymond W. Todd, Pacific Lighting Gas Supply Co., will talk on gas measurement for underground storage. C. J. Hauck, Ohio Fuel Gas Co., will discuss hydraulic fracturing.

New developments in detergents for cleaning pipelines will be reported by Clinton McClure, El Paso Natural Gas Co. Arthur Kohl and Fred Riesenfeld, Fluor Corp., will describe advances made in conditioning natural gas for transmission. R. D. Ricketts, Fish Engineering Co., will discuss prime movers and gas compressors.

Inside a Gas Meter Plant

ROCKWELL MANUFACTURING CO., DUBOIS, PA.

MULTIPLE THREADER 16 holes at a time are threaded in an aluminum-alloy gas meter body with this custom-designed tapping machine.



ACCURATE FITTING Special fixtures insure accuracy as a flag carriage is soldered on the diaphragm disc of a domestic gas meter.

EASY READING Making the meter reader's job easier by using a legible index on meters designed to maintain accuracy over a long period.

PROVING GAS METERS In this air-conditioned room, trained men carefully test and adjust gas meters for accuracy with the most modern type prover.

C. W. Studt, Union Gas System, chairman of the AGA committee on underground storage will be chairman at the general session, Tuesday. H. L. Fruechtenicht, Jr., Michigan Gas Storage Co., will present the annual statistical report on underground storage, compiled by the subcommittee on statistics which he heads. A. Bruce Bowden, Mellon National Bank & Trust Co., will talk on the financial aspects of underground storage.

Weather, in relation to gas dispatching, will be reviewed by Dr. Irving P. Krick, weather consultant, Denver.

Microwave in the gas industry will be discussed by C. E. Upson, Texas Illinois Natural Gas Pipeline Co. Clark F. Jones, National Fire Protection Association, will talk on "Disaster Control" and action taken by gas companies to continue services in emergencies.

Research and corrosion will be the subjects of J. L. Thompson, Michigan Wisconsin Pipe Line Co., head of the pipeline research committee and J. W. Berringer, Panhandle Eastern Pipe Line Co., vice-chairman of the committee on underground corrosion mitigation.

Monday, luncheon meetings will cover measurement, production, communications, compressors and pipelines. Tuesday meetings will be devoted to communications, storage, dispatching and the revised code for pressure piping.

E. N. Armstrong, Transcontinental Gas Pipe Line Co., will preside at the measurement meeting. W. E. Ferguson, The Ohio Fuel Gas Co., will head the group discussing natural gas production. S. A. Chadwell, Columbia Gas System Service Corp., will chairman the dispatching session.

IGT ANNOUNCES 1955 REFRESHER COURSES

An opportunity for engineers to familiarize themselves with current problems and practices of the natural gas industry will be offered in the 4th annual summer session at the Institute of Gas Technology, Chicago.

The program, set up as 3-week refresher courses for experienced engineers and as basic engineering studies for undergraduates at the college senior level, was designed to extend the services of the institute to the gas industry, according to E. S. Pettyjohn, Institute director.

"Natural Gas Production and Processing" will be presented June 13-July 2; "Natural Gas Transmission," July 5-July 22; "Natural Gas Distribution," July 25-Aug. 12, and "Natural Gas Fuel Utilization," Aug. 15-Sept. 2.

Each course is comprised of a series of lectures, discussion, quizzes, seminars, and inspections of natural gas operations in the Chicago area. The seminars are led by invited specialists in particular phases of gas operations.

Application may be made for enrollment in a single course only, or in several courses. Undergraduate students can earn eight credit hours by satisfactorily completing all 4 summer session courses between their junior and senior years, Capt. Pettyjohn said. Applications will be accepted up to 30 days prior to the opening day of the course desired. The tuition fee is $60 for each 3-week course.

Enrollment forms are available by writing: The Director, Institute of Gas Technology, 17 W. 34th Street, Technology Center, Chicago 16.

GEOLOGIST SEES CONTINUING GAS RESERVE GROWTH

A leading oil geologist said "there still appears to be about as many possible future oil and gas provinces in sight" in the United States and Canada as there ever were.

"I, for one," said A. I. Levorsen, consulting geologist, Tulsa, "see no lack of future supply in North America if we maintain the incentive to explore."

He made this optimistic prediction in an address at the spring meeting of the Southwest district of the division of production of American Petroleum Institute in New Orleans.

Mr. Levorsen said future important discoveries will depend on unorthodox, rather than scientific opinions about places to drill and that is why it is vital to the Nation's future oil supply that the economic and political environment continue to provide incentives for wildcat drilling.

"Practically all of our fear about the lack of future provinces comes so frequently now, as it has for as long as I can remember, from those who know the most about what has happened in the past—the more knowledge they have, the less future they see," he said.

"Scientists can only predict from what evidence they can see and measure, and current discoveries have always exhausted all of the possible orthodox scientific predictions. Probably no geologist was so unorthodox as to predict East Texas, West Texas, Alberta and many other provinces.

"When we stop to think about future petroleum provinces, we are really stepping out into an unknown area where the light is very dim. The evidence that can be used is at best fragmentary, and an opinion that some barren region will eventually produce oil and gas is generally made when every trap located by orthodox means has been drilled, and every known theory has been tested.

"Such an opinion is bound to be unorthodox and can only be made if it is based on some hitherto unknown or unused evidence—in geology this could be an unconformity, a reefing condition, a facies change, or buried folding and faulting. Our experience shows that these things occur frequently.

GAS METER PRODUCTION CONTINUES AT HIGH LEVEL

The growing use of gas appliances and home heating equipment in residential areas throughout the country promises to keep gas meter production at a high level, says L. A. Dixon, Jr., vice president, Rockwell Manufacturing Company's meter and valve division.

To meet this increase in the gas industry, Rockwell has expanded production facilities in 2 of its plants, Mr. Dixon says.

At DuBois, Pa., the production of large unit gas meters necessitated the construction of a 19,000 sq. ft. addition to the existing plant, and an 11,000 sq. ft. structure in nearby Sykesville. In the new plants, industrial gas meters ranging in capacity from 800-to-10,000 cf are manufactured.

At Norwalk, O., the construction of a 25,000 sq. ft. addition to the plant now permits a large volume of gas regulator production, and the establishment of a new laboratory for regulator development and testing.

KOPPERS NAMES CHAIRMAN AND PRESIDENT

W. F. Munnikhuysen was elected chairman of the board and Fred C. Foy was named president and chief executive officer of Koppers Company, Inc. at a special meeting of the company's board of directors.

Election of Mr. Munnikhuysen and Mr. Foy fills the vacancies created by the death, February 13, of Gen. Brehon Somervell, who had been both chairman and president.

Mr. Munnikhuysen has been executive vice president of Koppers since 1950. He joined the Company in 1916.

Mr. Foy, who joined Koppers in 1948, has been vice president and general manager of the company's tar products division since 1950, and a member of the company's board of directors since last May. For the past 6 months he has been on special assignment to the president's office. He was also elected a member of the executive committee of the board of directors.

BROOKLYN UNION REDUCES HEATING RATES

The Brooklyn Union Gas Co. has announced that a 10% reduction in gas house heating rates will become effective April 1, 1955.

Brooklyn Union states that it will now cost its customers less to heat their homes with gas than with any other fuel.

This rate reduction is attributed to the economies of natural gas and to the tremendous expansion in the company's house heating business over the last two years.

SPRING SALES CONFERENCE IN BOSTON

The 1955 AGA sales conference on industrial and commercial gas, in Boston, April 12-14, will have a streamlined program prepared by the committee under the chairmanship of Walter S. Anderson, Boston Consolidated Gas Co.

Following the pattern of previous years, the 3-day conference will have a commercial gas day on the 12th, a general session on the 13th and finish with industrial gas on the 14th.

3 NORTH SHORE MEN = 125 YEARS

Three employees of North Shore Gas Co. with a total of 125 years of service recently received engraved watches in recognition of their longevity with the company.

Thomas P. Clark, 43 years of active service, began his employment with North Shore Gas Co. in 1912. He has served as Southern district manager of the company for several years.

Joseph Hoff completed 41 years of service in February of this year. He has been employed in the service department for the entire time. His experiences include servicing of gas arc lamps, and the first gas-type refrigerators in use.

James J. Bellcom, also beginning his 42d year with North Shore, has served primarily as a maintenance man during his employment.

Gas Industry CALENDAR

MARCH

17-18 SGA conferences, Jung Hotel, New Orleans:
accounting management
distribution management
sales executive

21-23 AGA general management section, spring conference, Netherland Plaza, Cincinnati.

23-24 PCGA accident prevention conference, Santa Barbara, Calif.

24-25 NEGA, annual meeting, Hotel Statler, Boston.

24-25 Oklahoma Utilities Association, convention, Mayo Hotel, Tulsa.

28-Apr. 1 Western metals exposition (PCGA exhibit), Los Angeles.

APRIL

5-7 Univ. of Oklahoma—NACE, corrosion control short course, Norman.

12-14 AGA sales conference, industrial and commercial gas, Hotel Statler, Boston.

12-15 AGA distribution, motor vehicles and corrosion conference, Netherland Plaza, Cincinnati.

14 GAMA 6th annual range conference, Hotel Pierre, New York.

18-19 AGA residential section, eastern natural gas sales conference, Hotel Wm. Penn, Pittsburgh.

19-20 PCGA distribution conference, Phoenix, Ariz.

19-21 Southwestern gas measurement short course, Univ. of Oklahoma, Norman.

25-27 Midwest sales conference, Edgewater Beach Hotel, Chicago.

25-27 Electric and gas utility accountants, national conference, Conrad Hilton Hotel, Chicago.

27-29 AGA research and utilization conference, Hotel Statler, Cleveland.

MAY

1-4 LPGA convention, Conrad Hilton Hotel, Chicago.

2-3 PCGA transmission conference, Palm Springs, Calif.

2-6 AGA industrial gas school, Hotel Wm. Penn, Pittsburgh.

9-10 AGA gas supply, transmission, storage conference, Hotel Wm. Penn, Pittsburgh.

9-13 National restaurant exposition (AGA exhibit), Navy Pier, Chicago.

12-13 PUAA, Sheraton Hotel, Chicago.

16-18 SGA 47th annual convention, New Orleans.

17-19 Pennsylvania Gas Association, Pocono Manor, Pa.

18 PCGA non-residential sales clinic, Los Angeles.

19 PCGA residential sales clinic, Los Angeles.

23-24 AGA residential section, N.Y.-N.J. sales conference, Hotel Commodore, New York.

23-25 AGA chemical, engineering, manufactured gas production conference, Hotel New Yorker, New York.

31 AGA board of directors, The Homestead, Hot Springs, Va.

JUNE

1-3 SGA short course in gas appliances, University of Tulsa, Tulsa, Okla.

5-9 Canadian Gas Association, annual meeting, Sheraton-Brock Hotel, Niagara Falls, Ont.

9-10 Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont.

27-28 Michigan Gas Association, Mackinac Island, Mich.

JULY

18-Aug. 13 Southeastern Gas Association, short course in gas technology, Raleigh, N. C.

18-22 Western summer appliance market, Merchandise Mart, San Francisco.

29 AGA board of directors, Denver.

AUGUST

15-Sept. 10 Southeastern Gas Association, short course in gas technology, Raleigh, N. C.

SEPTEMBER

7-9 Mid-West Gas Association, school and conference, Iowa State College, Ames.

9 New Jersey Gas Association, Hotel Monmouth, Spring Lake.

11-13 INGAA, annual membership meeting, Jasper Park Lodge, Jasper National Park, Alberta.

OCTOBER

12-14 GAMA annual meeting, El Mirador, Palm Springs, Calif.

17 AGA board of directors, Los Angeles.

17-19 AGA-PCGA joint-convention, Los Angeles.

17-21 National metal show (AGA exhibit) Philadelphia.

24-26 Pacific Coast restaurant convention, Biltmore Hotel, Los Angeles.

NOVEMBER

13-18 ASME, Congress and Hilton hotels, Chicago.

14-17 API, San Francisco.

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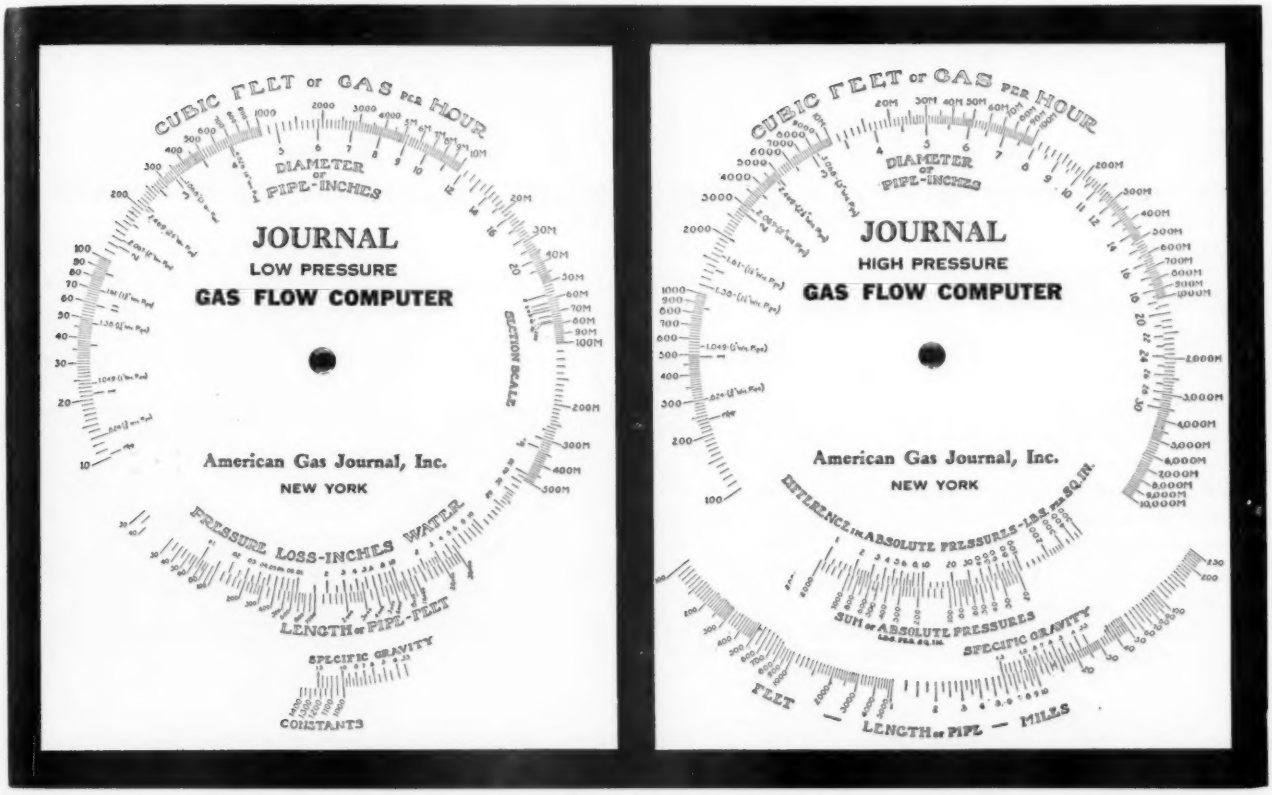

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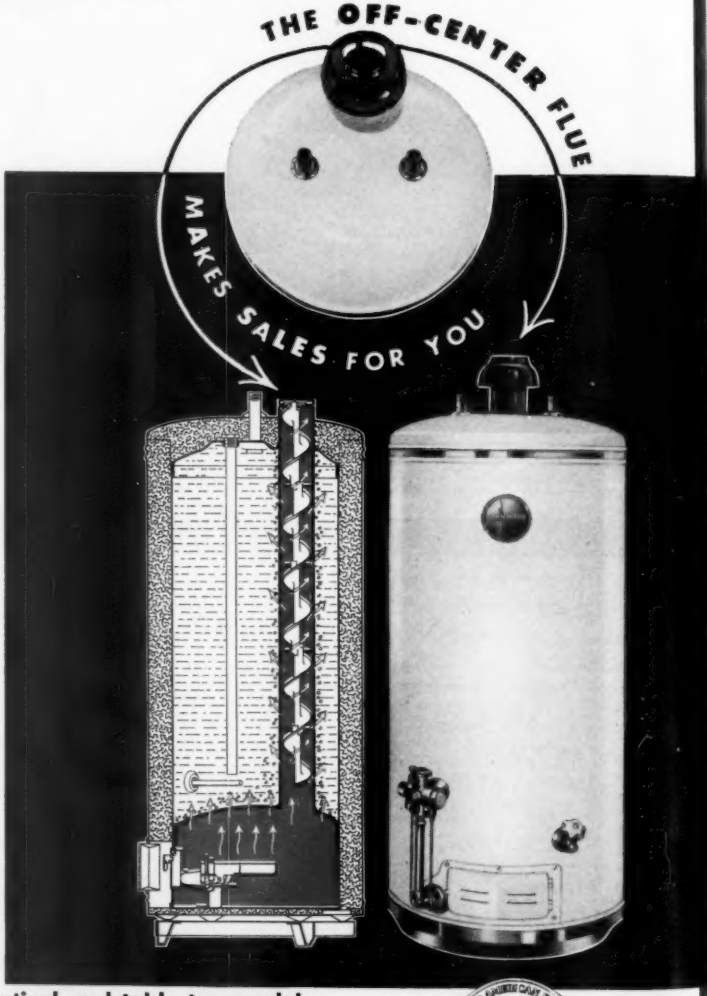

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